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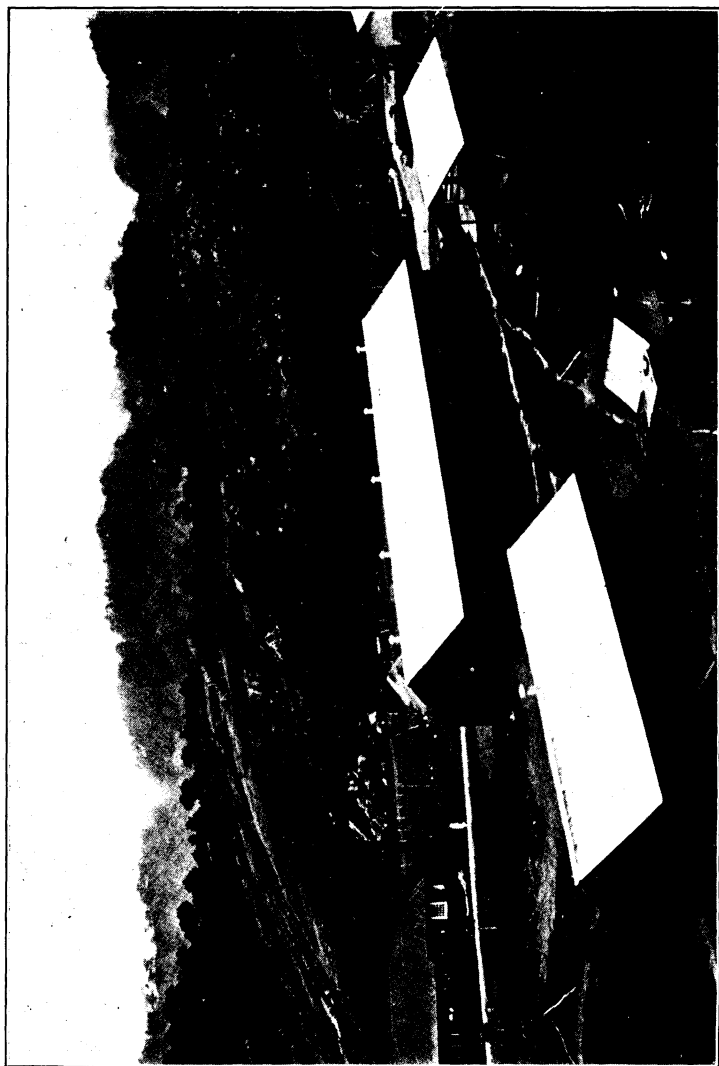


PLATE I.—BARN AT THE TRINIDAD STOCK FARM.

THE PHILIPPINE *Agricultural Review*

VOL. IV

JANUARY, 1911.

No. 1

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EDITORIAL.

A CONSERVATION POLICY FOR THE PHILIPPINES.

The conservation of natural resources is a subject that is engaging the attention of many of the leading thinkers of the world to-day. There are many different views as to what constitutes a proper policy for the conservation of natural resources.

In general, however, such a policy consists in the formation and execution of plans by means of which the natural resources of a country shall be so developed and used that they may continue to benefit the people for a long period, instead of being unnecessarily wasted or entirely destroyed by the present gen-

eration. This policy takes into account the general principle that the natural resources of any country are the heritage of the people who live in that country, and who are entitled to the legitimate use of these resources at any given time. No single generation, nor any small number of generations, have any right to so use the natural wealth of a country as to destroy it for future generations, but each generation owes it as a duty to posterity to so preserve these natural resources that they will be of equal, or increasing, benefit to all generations in perpetuity.

The Philippine Islands have not been represented at the different conservation meetings held in the United States, and have never had a conservation committee, as was suggested in the September number, 1909, of the REVIEW. The existing legislation pertaining to many of the natural resources of these Islands shows, however, that a distinctly advanced line of thought on this subject has influenced those who have regulated by law the use of the natural resources of the Philippines. The conservation of mineral and forest products is fairly well assured under our present laws, and the better use of the irrigation waters through a system of Government irrigation projects has been undertaken. There exists, also, legislation to prevent the exploitation of the agricultural lands of the Islands by prohibiting their acquirement in large quantities by concerns having a monopolistic tendency, and offering them in small bodies as homesteads to all people of the country who desire to take them. There is in the conservation ideas of existing legislation a very strong current which tends to conserve these resources by prohibiting their use rather than encouraging their development at the present time, or increasing their value for future generations. This, however, may properly be considered a desirable, rather than an undesirable, feature of the existing laws, as it has effectually prevented exploitation in almost every line, and now that the defects in existing laws, which are preventing the legitimate use of our natural resources, are becoming evident there will no doubt be a tendency to correct such defects as the years go by. There is not, and can not be, any reasonable objection to the use of natural resources if they are not destroyed or lessened in value; while, on the other hand, their development and use should by all means be encouraged when their value is thereby enhanced for future generations.

Conditions in the Philippine Islands, at the present time, are in many respects similar to those in sparsely settled coun-

tries like Argentina, South Africa, Australia, and the south-western portion of the United States, in that there exists in these Islands a great abundance of natural resources, a large part of which are not being used. There are, however, many portions of the Philippines where the bounties of nature have been drawn upon so freely that they have been exhausted without any great benefit to those who have used them. This is particularly true in the cutting away of forests near the centers of greatest density of population, and in the mountain districts where the nomadic tribes are continually engaged in clearing spots of land (*caingin*) for planting mountain rice. These simple people do not realize that they are cutting away hundreds of pesos worth of timber in order that they may grow a few pesos worth of rice, only to abandon the land and allow it to grow up in grass, the annual burning of which prevents reforestation.

The five great classes of natural resources of the Philippines—the forests, the mines, the inland waters, the fisheries, and the soil—are performing their natural functions of supplying the population with the primary necessities of life in that abundant but spasmodic way so noticeable in the Tropics. The population of the Philippine Islands, which now numbers nearly 8,000,000, draw from field, forest, stream, and coastal waters all of the necessities of life and some of the luxuries. If each inhabitant uses products obtained from these sources having a value of only ₱50 per annum, the value of the products thus consumed would be ₱400,000,000. Besides this there is an export trade, coming almost entirely from the soil, and amounting to ₱80,000,000.

The forests of the Philippines produce annually a product valued at about ₱6,000,000 and the mineral resources contribute to our products about two and a quarter million pesos. These figures represent only a small fraction of the possibilities of nature's bounties in the Philippines under a modern system of development with conservation.

The Philippines contain a total area of 29,791,734 hectares¹ of which approximately 10,000,000 hectares are in virgin forests, 1,300,000 hectares in cultivated lands, and 18,500,000 hectares in second-growth timber and unused land. Almost all of the latter class is unoccupied public domain covered with a growth of cogon grass, scrub, and noncommercial forests, as a result of deforestation by the cutting of timber, the clearing of small plats for rice growing, and the subsequent ravages of fire.

¹ Census of the Philippine Islands, 1903.

The mineral lands are already attracting the attention of miners and the forest resources are slowly being developed, but thus far the greatest natural wealth of the Philippines, consisting of its unoccupied lands, has received practically no attention. It is to this resource more particularly that we desire to direct attention. One who is not familiar with the Tropics probably does not realize the wonderful growth of vegetation which takes place during the rainy season and the fearful consequences from fires during the dry season, when the grass and weeds have died down and dried so as to become a ready fuel when touched by the drip of pitch torches or a spark from a nomadic camp fire. From the standpoint of grazing, however, these lands are really more useful during the dry season than when rain is abundant and the growth is rank and coarse. With the great abundance of land of this class in almost every province of the Philippines, and almost entirely covering some islands in the sparsely populated sections, the Archipelago can justly lay claim to being one of the best natural grazing countries in the world.

In Spanish times and before the advent of rinderpest, grazing was a great industry in the Islands, and so abundant was the supply of cattle and carabaos that the price for such animals was very low, but with the introduction of rinderpest into the country a large part of the cattle and carabaos were destroyed. The insurrection followed and the restoration of peace required more than five years, during which time there was a general decline in Philippine agriculture and the cattle industry of the Islands almost ceased to exist. The latter can never be successfully restored on a large commercial scale until such time as rinderpest and surra are completely eradicated in these Islands, but when that time comes there is not a shadow of doubt that the great extent of territory, constituting one of our most valuable natural resources, will again be dotted everywhere with herds of cattle, carabaos, and horses.

The possibilities in this direction are almost unlimited both as to the direct value of product and from the standpoint of Government revenue. If only half of the unused lands of the Islands are considered suitable for grazing purposes and one hectare is allowed for the sustenance of each animal, the country would support herds aggregating nine million head, having a value of not less than ₱600,000,000. The present number of animals in the Islands probably does not exceed 1,000,000, and there is an annual importation of about 50,000 head of cattle, used principally for slaughter, and meat products equivalent to another

50,000 head are imported each year. The total annual expenditure for these animals and animal products, which could be produced in the Philippines, is from ₱6,000,000 to ₱8,000,000.

The most valuable feature of conservation for the Philippines would be to put into use as large an area as possible of these unoccupied lands for grazing purposes after the total eradication of animal diseases, thereby making the business reasonably safe with the assurance of abundant profits. The land should not be sold but leased for a reasonable period in areas of such size as would be sufficient for all of the animals which any person or firm desired to maintain. The terms of the lease might be the same as the present lease of public domain, but probably a better arrangement for both the ranchers and the Government would be to mark out a territory to be occupied by each lessee and use a system of charges per head per animal. The stock raiser would then have to pay only for the animals grazed and as the herds grow larger year by year the revenues derived therefrom would grow in like proportion. In this way resources which are now giving no profit could be made to yield a handsome revenue, which should, in the beginning, be devoted entirely to the further development of the natural resources and agricultural industries of the Islands.

One of the first steps should be the establishment of forest nurseries of the best classes of timber in all large grazing districts and transplanting the young trees to the open lands with ample means of protection from destruction by animals and by fire. These trees can be so planted that they will not injure the lands for grazing purposes for twenty to thirty years, at the end of which time the forest of high grade timber will make the land more valuable for forests than for grazing purposes. The coarse grasses which are least useful for pastures in the Philippines thrive best in open lands, while the shorter grasses best suited for grazing flourish under partial shade. This combination of grazing and reforestation will not only be self-sustaining from the beginning, but will greatly enhance the value of the lands by the establishment of forests of the most valuable timbers of the Islands, which will by shading improve their value for grazing purposes and in turn the land will be enriched by virtue of the presence of animals thereon. Under such grazing contracts the lands would automatically revert to the Government and might be re-leased for grazing purposes, retained as commercial forests, or devoted to agriculture after the removal of the timber. As the great bulk of the unoccupied land of the Islands will not be required for agricultural pur-

poses for a quarter or a half century, unless there should be some unusual influx of population into the Islands, it is certain that the adoption of the proposed policy of leasing the lands for a long period of years could do no harm and on the other hand would result in untold benefits in many directions.

As a preliminary step in this work the Government of the Philippine Islands, and if necessary that of the United States, owes it as a duty to the people of these Islands to take immediate and drastic action, with the definite object in view of totally eradicating dangerous communicable animal diseases, more particularly rinderpest and surra, and forever prohibiting their reëntrance here again. Until this is done the live-stock business is extremely hazardous and there is no possibility of its extensive development.

REPORT OF THE DIRECTOR OF AGRICULTURE FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

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DEPARTMENT OF PUBLIC INSTRUCTION,
BUREAU OF AGRICULTURE,
Manila, P. I., August 12, 1910.

SIR: I have the honor to submit herewith the annual report of the Director of Agriculture for the fiscal year ending June 30, 1910.

ADMINISTRATIVE DIVISION.

The extensive operations of the veterinary corps necessitated a material increase in the number of American employees during the past year. Of forty-one appointments to classified positions, twenty-four were veterinarians; three, agricultural inspectors; three, agricultural assistants; one, superintendent tobacco experiment station; four, American clerks; and six, Filipino clerks. There were separated through resignation, transfer, and otherwise, four veterinarians, four agricultural inspectors, four Amer-

ican clerks, and two Filipino clerks. The net increase at the close of the fiscal year was twenty American and seven Filipino employees. There has developed an appreciable degree of increased efficiency in the personnel, attributable to the correlation of the work of the sections within divisions and to the increased coöperation of each division with the others.

PUBLICATIONS.

The following publications have been issued during the year: May and June numbers of THE PHILIPPINE AGRICULTURAL REVIEW for 1909, the twelve numbers of the REVIEW for the fiscal year 1909-10; a revision of Farmers' Bulletin No. 12, "Abacá (Manila hemp)"; and Rinderpest Circular No. 1.

THE PHILIPPINE AGRICULTURAL REVIEW.

The work of the office of publications has been confined almost entirely to the publication of THE PHILIPPINE AGRICULTURAL REVIEW. The aim during the past year has been to make the REVIEW a magazine that shall meet the needs of the farmers throughout the Philippine Islands and bring them more closely in touch with the work of the Bureau of Agriculture. The many letters received from farmers expressing their hearty appreciation of the REVIEW, and the large number of requests that are received for both English and Spanish copies, indicate that this publication is doing a useful work.

Two special numbers of the REVIEW have been published during the year: the Annual Report of the Director of Agriculture in the January number, 1910; and the Carnival number for March, 1910.

The following table shows the principal subjects that have been covered in the REVIEW during the year and the number of pages devoted to each subject:

Subject.	Number of arti- cles.	Number of pages.	Subject.	Number of arti- cles.	Number of pages.
Rice	2	11	Mango	1	4
Coconut	5	11	Oranges	1	6
Pineapple	3	20	Rubber	2	14
Sugar	12	25	Live stock, etc.	8	41
Tobacco	7	21	Poultry	3	9
Abacá	7	22	Locusts	3	18
Kapok	3	11	Rat pest	1	5
Silk culture	1	4	Irrigation	2	8
Corn	1	7	Agricultural education ..	9	31
Coffee	1	7	Conservation	1	5
Cacao	3	15	Good roads	1	6
Peanuts	1	17	Labor	1	1
Ginger	1	4	Homesteads	1	2

In addition to the above a great deal of material on general agricultural conditions, both in the Philippine Islands and in other tropical countries, also statistical material, has been published in the REVIEW.

The circulation of the REVIEW is now about 6,000. The English edition is sent to 290 persons in Manila, 1,302 in the provinces, 17 in Hawaii, 253 in the United States, 5 in Porto Rico and 228 in foreign countries. The Spanish edition of the REVIEW is sent to 128 persons in Manila, 2,688 in the provinces, and 42 in foreign countries. The exchange list of the REVIEW includes practically all of the leading magazines on tropical agriculture throughout the world.

MISCELLANEOUS PUBLICATIONS.

A revised edition of Farmers' Bulletin No. 12, "Abacá (Manila hemp)," has been published during the year, also Rinderpest Circular No. 1. There is a widespread demand for printed matter on the following subjects: Coconuts, sugar, tobacco, and garden work. Material for bulletins on these subjects is being collected.

LIBRARY.

The work of the librarian includes: (a) The care of the books, periodicals, pamphlets, maps, etc., in the library; and (b) the mailing and distribution of THE PHILIPPINE AGRICULTURAL REVIEW and other printed matter of the Bureau Agriculture.

A considerable part of the books in the Bureau of Agriculture library belong to the Bureau of Science and are held on memorandum receipt. A large amount of material on agricultural subjects in the form of bulletins, pamphlets, and periodicals is being collected each year by the Bureau of Agriculture, and this material now forms an important part of the library.

The material in the library is available for use by the general public during the regular office hours of the Bureau. Books not in too constant use are loaned to responsible persons on memorandum receipt.

The distribution of THE PHILIPPINE AGRICULTURAL REVIEW and the bulletins published by the Bureau occupies the larger part of the time of the library force. There is a large and constantly growing demand for printed matter on agricultural subjects, and during the year 4,409 back numbers of the REVIEW were distributed in response to these requests.

The mailing list of the REVIEW has been revised during the year and a substantial amount of "dead material" has been dropped from this list.

In October, 1909, about 1,500 copies of the United States Department of Agriculture Yearbooks for 1907 and 1908 were received from Hon. Benito Legarda for distribution. These yearbooks have formed a valuable addition to our supply of agricultural literature.

AGRICULTURAL EXTENSION WORK.

Señor Pablo Tecson, superintendent of agricultural extension work, has visited the Provinces of Batangas, Bulacan, and Nueva Ecija during the year in the interest of agriculture.

In these provinces conventions have been held with the provincial and municipal officials and leading farmers. At these conventions agricultural questions of general interest have been discussed and information furnished regarding the work of the Bureau of Agriculture.

CROP REPORTING AND STATISTICS.

Crop and live-stock reporting under the provisions of Act No. 1898 of the First Philippine Legislature, "An Act providing that municipal presidents shall make special quarterly reports on the condition of agriculture, live stock, and on other matters in their respective municipalities," was started on July 1, 1909. The preparation of crop reports under this new system was work with which all of the municipal reporters were unfamiliar, and as a result the majority of the reports received for the first quarter had to be returned for correction. There has been a gradual improvement, however, in the quality of the reports received for each succeeding quarter, and it is believed that the passage of Act No. 1898 has done much toward placing the crop-reporting work on a satisfactory basis.

For the purpose of keeping this Bureau in constant touch with agricultural conditions in each municipality the monthly crop reports are being continued. The monthly report covers general agricultural conditions, such as the condition of crops and live stock, injuries to crops from pests, local prices of crops, etc., while the quarterly report is largely statistical.

The following is a summary of the reports received during the year: Total number of monthly reports received, 4,220; total number of quarterly reports received, 2,646; total number of regular correspondents at end of year, 797.

The data included in the quarterly reports are tabulated for each province and municipality, separate tabulations being made for crops and live stock. Tabulations are also made of the local prices of staple crops as shown by the monthly reports.

The establishment of an efficient and satisfactory crop-report-

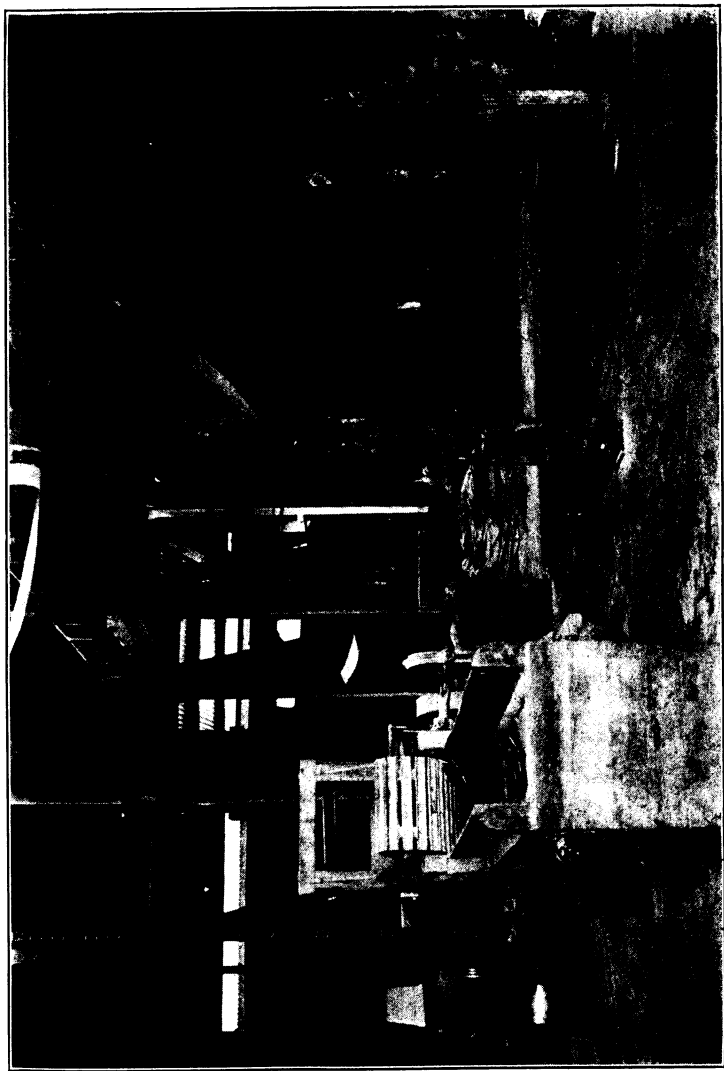


PLATE II.—INTERIOR VIEW OF THE FORAGE FACTORY AT PANDACAN, MANILA.

ing service, even under the most favorable conditions, is a work that requires years to accomplish. This work, however, is an essential part of agricultural development. In view of the obstacles that have had to be met it is considered that substantial progress has been made in this work during the year.

FORAGE FACTORY.

The machinery installed for the purpose of drying and manufacturing forage from Philippine products has been in operation during the greater part of the year. Experimental lots of forage have been made and sent to the Army and the city stables for test; these mixtures were composed of dried guinea grass, ground corn, and ground beans. The ingredients were so mixed as to give a complete ration similar to the crushed fodders purchased on the markets. These samples were reported upon adversely by both the Army and the city stables. It was claimed that the animals could not be induced to eat the mixture. However, the same mixture has been used at the farms of the Bureau with good results.

After several experiments in drying green grass by artificial heat it was found to be unprofitable, owing to the large amount of coal and labor required to drive off the water to such an extent that the grass would keep when packed in bulk. It was then decided to buy grass, corn fodder, and other roughage after it had been field cured. This met with more success. The only thing now standing in the way of using large quantities of this field-cured fodder is the question of transportation. The small farmers who provide the bulk of this kind of fodder have no means of baling the fodder, and when not baled the freight charges are excessive. A mixture was then tried of ground corn, ground beans, and bran; the mixture having a composition about equal to that of oats. This mixture has been used in large quantities at the farms of this Bureau and the serum laboratory where large numbers of animals have been fed with good results. Further experiments will be undertaken to successfully dry green forage for the purpose of supplying roughage as soon as a new drier can be secured.

CROP PESTS.

The time of one agricultural inspector has been given to this work during the entire year. Many reports have come in relative to damage done by rats, wild hogs, and insect pests such as locusts, and cutworms.

Rats do more or less damage to cultivated crops in most all parts of the Islands, but the larger number of reports come

from the Island of Luzon. The general habits of the rodents and the unfailing food supply renders the use of poisons for exterminating them impracticable. Traps, however, were generally successful as agents in controlling them, and will be used to a greater extent in the future. In their relations to the sugar crop the amount of damage done by the individual rat is greater than that to any other crop. This is due to the fact that whenever a cane is gnawed the entire cane is spoiled by fermentation.

Locusts were prevalent in a number of localities during the months of August and September, due largely to the prevailing drought which was favorable to them. The pest was investigated in La Laguna Province and experiments with insecticides were tried. Under American supervision these were generally successful, but it was found not advisable to put insecticides into the hands of those not accustomed to their use. They do not seem to be able to comprehend the danger attending the grazing of cattle on poisoned foliage.

In connection with investigations made relative to the damage done by wild hogs to young coconut groves, examination showed that the loss by the hogs could in a great degree be abated by a little more exertion on the part of the owners in cleaning out some of the undergrowth in the vicinity of the groves.

During the tobacco season, the entire Cagayan Valley was visited and a study of the insects that affect the tobacco crop of that district was made. Special attention was given to the species that affect the growing plants and preventative methods were suggested.

During the latter part of the year a caterpillar resembling the army worm made its appearance in northern Batangas. Special attention was given this matter owing to the fact that the species, which was a common native one, had never before reached such proportions as would warrant it being classed as a serious pest. Specimens of this species have been taken in many of the provinces of Luzon and an examination of the agricultural journals of India shows that it also occurs there, sometimes causing considerable local loss.

The cause of the Batangas outbreak may be attributed, in part at least, to the building of the railroad through the district which has caused larger areas to be brought under cultivation, thereby making conditions favorable for such an increase. Little trouble need be anticipated in the future from this insect, as a study of a large number of individuals showed that a large percentage of them were carrying the eggs of a small parasitic



(a)
PLATE III.—ABACÁ: (a) MAGUINDANAO AND TANGONGON VARIETIES. (b) LIBUTON VARIETY.

fly. So great was this percentage that during the next season their number will be so greatly reduced that their presence in the rice fields will be hardly noticeable.

DIVISION OF PLANT INDUSTRY.

This division includes all general plant investigations, seed distribution, laboratory and field tests of seeds, and work at the experiment stations. Experimental work is carried on at the following places: Singalong experiment station, located in the southern part of Manila on sandy soil, at sea level; Baguio experiment station, located at Trinidad, subprovince of Benguet, at an elevation of 1,500 meters; Lamac experiment station, located at Lamac, Bataan Province, at sea level; Ilagan station, located at Ilagan, Isabela Province, devoted to tobacco culture; and La Granja Modelo, located near La Carlota, Occidental Negros. The latter station is devoted largely to experiments with sugar cane, maguey, abacá, and rubber.

At the beginning of the fiscal year a fiber expert was appointed to study the fiber plants of these Islands and make recommendations to the fiber growers.

PLANT INVESTIGATION.

ABACÁ.

Practically all of the abacá districts of the Islands were visited by the fiber expert during the year. The fiber growers, as a rule, have entered heartily into coöperation with the Bureau and gratifying results are expected. A study of the varieties of abacá shows that there are some fourteen varieties growing in the various districts. The principal differences among these varieties are color, shape, size of stalk, their tendency to multiply, yield, and quality of their fiber. While the names are not as yet well established they are in common use in the districts where the varieties are found. The following table shows weight, length, circumference, and per cent of fiber in nine of the leading varieties:

Names of varieties.	Average weight of one stalk.	Average length of stalk.	Average circumference at—		Weight of dry fiber from 3 stalks.	Percentage of fiber.
			Base.	Top.		
	<i>Kilos.</i>	<i>Meters.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Kilos.</i>	
Tangonon	88.67	5	84	40	6.89	2.6
Bangulanon	33.50	3.8	59	33	2.34	2.3
Maguindanao	86.50	4.6	84	36	4.40	1.7
Libuton	72.70	4.3	84	41	3.73	1.7
Arupan	69.70	3.9	79	46	3.78	1.8
Putean	63.30	4.1	71	36	3.42	1.8
Sinaba	62	4.2	72	43	2.52	1.3
Baguisanon-lawaan	106	5.4	87	41	4.53	1.4
Agutay	39.80	3.8	65	35	1.80	1.5

Taking all things into consideration the first five varieties may be considered most desirable.

Low-grade fiber.—It was noticed that in nearly all the abacá districts the large percentage of low-grade fiber usually coming from these districts was due to one or more of the following causes:

1. Knives with serrations too far apart.
2. Reduction of the tension of the knife on the block of wood.
3. Delay in pulling the strips after they have been separated from the sheaths.

4. Leaving the hanks of wet fiber tied up under shade.

5. Exposing the fiber to successive changes of sun and rain.

It is obvious that the last three practices impair the quality of the fiber and possess no advantage whatever. There can be no reason that justifies such neglect in the handling of the fiber.

Owing to the low price of hemp prevailing during the last year and a half, the fields have not been kept in prime condition; many fields have been dug up and planted to other crops. This will result, in a short time, in reducing the available supply to such an extent that the price is bound to increase.

Abacá waste.—The planters have taken great interest in this subject and offered to coöperate with the Bureau in getting a market established for this product which has heretofore gone to waste.

Abacá-stripping machines.—There are four abacá-stripping machines on the market at this time, but none are in extensive use. An attempt was made during the last Philippine Carnival to have all of these machines on exhibition, but only two companies exhibited.

MAGUEY AND SISAL.

No extensive investigations were made of these plants during the year, as most of the time of the fiber expert was given to abacá. An inspector, however, was in the maguey and sisal districts of Cebu for three months giving instruction to the people relative to planting and harvesting. Much difficulty was experienced in getting them to give sufficient space to the plants when setting out. They seem to think that the more plants they put on the land the more fiber they get.

One and one-half million sisal bulbils were furnished the Philippine Railway Company for distribution along their lines in Cebu and Panay.

Aside from the above-mentioned plants data were collected relative to the following: Pineapple (*Ananas sátiva*); cabo-



(a)

(b)

PLATE IV.—ABACA: (a) SINABA AND TANGONGON VARIETIES. (b) BAGUISANON LAWAAN VARIETY.

negro (*Arenga saccharifera*) ; pugahan (*Caryota urens*) ; anahao (*Corypha*) ; and the ticog grass from which are made the famous Samar mats.

Farmers' Bulletin No. 12, relating to the fiber industry has been revised and republished.

RUBBER.

Further data relative to the three species of rubber growing at Singalong experiment station are given in the following table, showing the growth during the past three years. These measurements were taken one meter from the ground.

[Centimeters in circumference.]

Tree.	Hevea braziliensis.			Castilloa elastica.			Manihot glaziovii.	
	1908	1909	1910	1908	1909	1910	1909	1910
No. 1 -----	21	27	40	31	40	48	39	45
No. 2 -----	24	35	53	30	(*)	-----	46	56
No. 3 -----	22	33	43	37	42	(*)	51	66
No. 4 -----	26	36	49	27	37	45	-----	-----

* Blown down by storms.

The plantation of Ceara rubber at La Granja Modelo has been increased to two hundred and eighty trees. These trees are growing vigorously and have produced quite a quantity of seed, which was collected and distributed. About eighty of these trees are now ready for tapping.

COFFEE.

The fifteen trees of Maragogipe hybrid coffee growing at the Singalong station yielded a total of 8 liters of dried seed during the year. The berries were small, though the quality appeared good. The trees seem to be healthy and some produce fairly well while others produce practically nothing.

The Liberian coffee planted at Lamao experiment station has made a growth of about one meter during the year. Considerable ripe fruit has been harvested and distributed for planting.

CITRUS FRUITS.

The Lisbon lemon trees growing at Lamao began bearing in March. About one hundred and fifty fruits have been taken from ten trees, leaving quite a number of fruits on the trees at the end of the fiscal year. The lemons are normal in shape, thickness of rind, and acidity, but the strictly lemon flavor is wanting. No reason for this has been discovered. The trees are free from disease and continue to make vigorous growth.

One hundred orange trees, twenty-five trees each of four varieties that appeared to be suitable for this climate, have been imported, half of each variety have been set out at Lamao and the other half sent to the orange district near Lipa.

AVOCADO PEARS.

Two of the avocado pear trees growing at the Singalong experiment station bore fruit this year for the first time. The quality of the fruit was up to the standard. The trees are making vigorous growth and it is hoped that the remaining trees will bear fruit soon.

BANANAS.

Data relative to varieties of bananas grown at Lamao were collected as follows:

The *matabia* variety of banana is from 16 to 20 centimeters in length, 5 centimeters in diameter, of a brownish yellow color when ripe, has an acid flavor, and may be used as a substitute for apples when cooked. The cost of growing was 5.7 centavos per bunch.

The *lacatan* is from 10 to 13 centimeters long, 3.5 centimeters in diameter, of greenish yellow color, sweet in flavor, and is said to be the best variety of banana grown in the Islands. The cost of growing per bunch was 47 centavos.

The *gloria* is from 10 to 12 centimeters long, 3 to 3.5 centimeters in diameter, of a dark yellow color, and has a sweet flavor. The cost of growing per bunch was 11.7 centavos.

The *Chinese dwarf* is from 12 to 16 centimeters long, 3 to 3.5 centimeters in diameter, light yellowish green color, sweet flavor, but is a poor shipper. The cost of growing per bunch was 38.6 centavos.

The *latundan* is from 8 to 12 centimeters long, 3 to 3.5 centimeters in diameter, bright yellow color, acid flavor, and is the most common variety grown in the Island of Luzon. The cost of growing per bunch was 2.8 centavos.

The *saba* is from 7 to 10 centimeters long, 4 to 5 centimeters in diameter, brownish yellow color, has no distinct flavor, and is used for cooking only. The cost of growing per bunch was 3.2 centavos.

The cost per bunch was obtained by counting the cost of labor in caring for one-tenth hectare of each variety and dividing the cost by the number of bunches obtained. Most of these varieties were planted at the rate of 700 plants per hectare; the larger growing varieties require more room than the smaller ones like the Chinese dwarf.



PLATE V.—LIBERIAN COFFEE TREE AT LAMAO EXPERIMENT STATION.

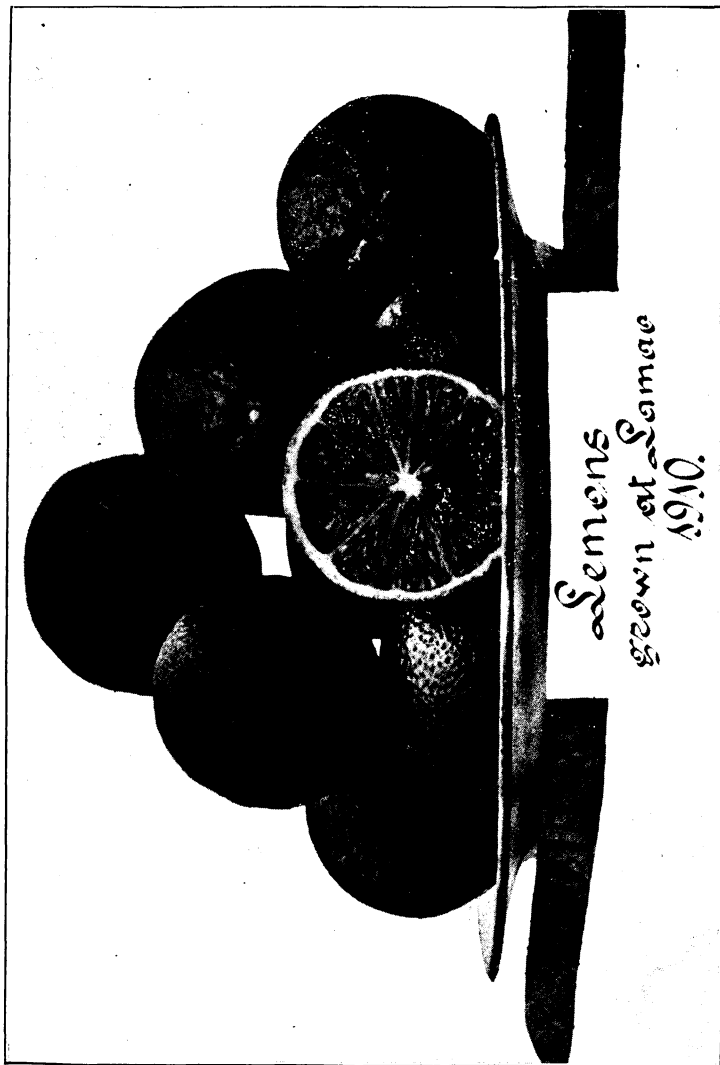


PLATE VI.—LISBON LEMONS GROWN AT LAMAO EXPERIMENT STATION.

CORN.

During the preceding year a plat of ground at the Singalong station was devoted exclusively to the production of Mexican June corn for the purpose of ascertaining the number of crops and yield possible within a year. This plat was planted June 23, 1909, on ridges 20 centimeters high and 90 centimeters apart. The crop was gathered on September 30, 1909, and the plat replanted on October 15 in the same manner. During the growing period of both of these crops the soil was very wet, so that thorough cultivation was impossible and the corn made rather unsatisfactory growth. The first crop was also seriously injured by a typhoon which occurred during the time when the corn was blooming. After the harvest of the second crop on January 22 and 23, 1910, the ground was plowed and ridged as before and planted on February 2; this time, however, the seed was put into furrows instead of on the ridges as before to insure deep rooting during the dry season. It was necessary to replant a part of the plat February 15 on account of the failure of a great deal of the first seed to germinate. This crop received such irrigation water as was necessary. Frequent cultivations were given, the last cultivation being on April 4, leaving the ground nearly level. The corn ripened unevenly on account of the replant. The first planting was gathered May 15 and the replant May 31. Planting again occurred on June 9. The following table will show the results in condensed form:

Crop.	Date planted.	Date harvested.	Number of days to mature.	Yield of ear corn per hectare.
First.....	June 23, 1909.....	September 30, 1909.....	99	<i>Kilos.</i> 1,300
Second.....	October 15, 1909.....	January 22-23, 1910.....	100	1,858
Third.....	February 3, 1910.....	May 15-31, 1910.....	103	2,840
Fourth.....	June 9, 1910.....
Total.....	5,998

Thus, in the total time of 302 days a yield of 5,998 kilos of ear corn per hectare was produced. This amount of corn in the ear would, according to recent tests of Mexican June corn, equal about 4,798 kilos of shelled corn per hectare. A heavy dressing of stable manure was given to this land previous to the first planting. This variety grown at Lamao station produced at the rate of 3,381 kilos per hectare for one crop, without any fertilizer. We are now prepared to distribute this variety extensively.

Two varieties of native white corn from Siquijor, called by the inhabitants of that island *saguiril* and *kalapdos*, have been planted at the Lamao station. The yield of the latter appears to be prolific, while the former does not promise so well.

RICE.

During the last two years considerable time and money have been expended in collecting data relative to rice culture. The names of varieties grown have been collected from each of the rice-growing provinces; samples of varieties, or descriptions of them, were obtained wherever possible. These samples were worked over in the office, taking color, measurements of grains, whether glutinous or nonglutinous, and all other data relative to the grain, that could be obtained. One hundred and sixty-five lowland varieties were planted at Alabang on what is considered good land. Data relative to the behavior of varieties under field conditions were recorded. Such duplicates as could be recognized were taken out and the remaining varieties replanted together with about two hundred and sixteen other varieties collected during the year.

Some three hundred and fifty-five varieties of upland rice were planted at Lamao during May, the conditions at this farm being favorable for upland rice. As soon as the data for this crop is in, a comparison of varieties will be made.

SEED DISTRIBUTION.

During the year we have distributed 8,010 packages of vegetable seeds, 784 collections of flower seeds, 6,732 kilos of Mexican June corn seed, 8,480 maguey bulbils, besides the 1,500,000 sisal bulbils furnished the Philippine Railway for distribution, 44,150 mulberry cuttings, 999 collections of tobacco seed, and other miscellaneous seeds and plants. Two hundred kilos of Robusta coffee seed was distributed in the Mountain Province and Basilan. Cotton seed has been distributed largely in the Mountain Province and Mindanao.

EXPERIMENT STATIONS.

The work of the various experiment stations and farms of the Bureau has been hampered more or less during the past year, as in former years, on account of lack of funds for carrying on the work. We are yet without a superintendent of experiment stations, owing to the fact that a suitable man can not

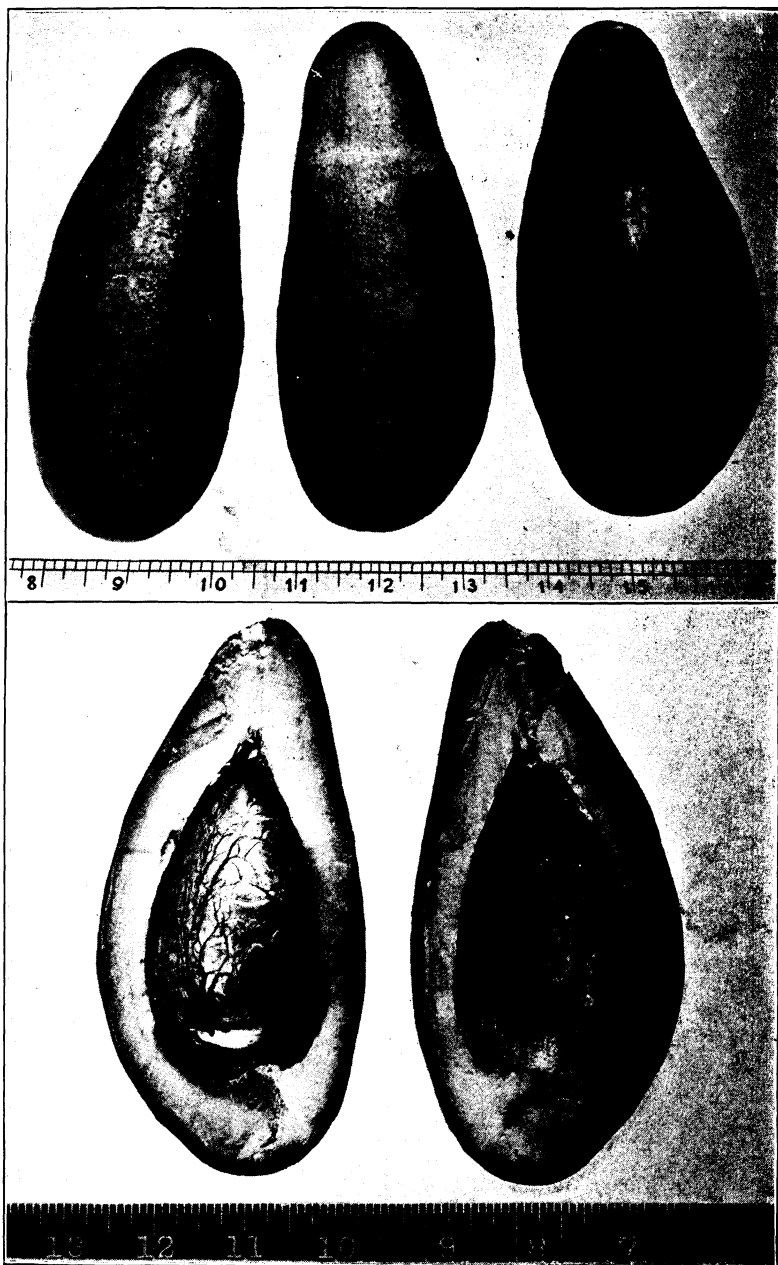


PLATE VII.—AVOCADO PEARS GROWN AT SINGALONG EXPERIMENT STATION.

be found at the salary which we are prepared to pay, however, we are in communication with a man now whom we hope will be secured. Considerable progress has been made in the investigations of crops, methods of culture, etc.

SINGALONG EXPERIMENT STATION.

The work at the Singalong experiment station was in charge of Mr. H. A. Ireland from the beginning of the fiscal year to September 6, at which time he was relieved by Mr. W. N. Birch. Very little experimental work has been carried on at this station during the past year owing to the fact that the Bureau expects to give up the grounds as soon as it can conveniently do so. Guinea grass has been grown on the greater part of the area for the purpose of supplying green grass for the cattle, horses, etc., also for the purpose of supplying requests for roots of guinea grass. This station is now used largely as a temporary quarantine station for live stock awaiting shipment to the serum laboratory.

BAGUIO EXPERIMENT STATION.

This station was in charge of Mr. M. C. Merrill from the beginning of the fiscal year until August 21, at which time he was relieved by Mr. E. S. Haskell, as superintendent, and Mariano M. Cruz, as foreman. The work at this station during the past year has been quite similar to that reported for the previous fiscal year. Practically the entire area has been devoted to the growing of vegetables for supplying the Baguio market. A much larger quantity of vegetables, however, has been grown than during the previous fiscal year. The total receipts for sales of vegetables amounted to ₱4,102.71, exceeding the amount expended for labor by ₱448.20.

Considerable damage was done to the crops on the farm by the very heavy typhoon which occurred on the 13th of October. It is safe to say that more than 75 centimeters of rain fell during the thirty-six hours which this typhoon lasted. Considerable damage was done by the high water depositing sand and silt over the small plants, such as strawberries.

During the year an attempt was made to grow green corn and guinea grass for the stock farm, but owing to the fact that the land used for this purpose had not been under cultivation for some years and was rather poor, the returns did not justify the expense; however, if the same land can be retained for a number of years, it is safe to say that the returns would be profitable after the land had been subdued and properly drained.

LAMA O EXPERIMENT STATION.

This station has been in charge of Mr. O. B. Burrell, agricultural inspector, during the entire year. The work carried on consisted principally of the testing of tropical vegetables, fruits, and flowers. The location of this station makes it very favorable for this work, as the temperature is somewhat higher than the other stations belonging to the Bureau and the farm is well supplied with water for irrigation, also by reason of the fact that very little damage is done by typhoons owing to the protection afforded by the mountain range between this farm and the open sea. The damage done by wild hogs has been eliminated by the construction of a heavy woven-wire fence around the cultivated area.

LA GRANJA MODELO.

The work at La Granja Modelo was in charge of Mr. F. E. Deason from the first of the fiscal year until April 1, 1910, when he resigned and Mr. R. E. Burris was placed in charge. The work at this station has been continued along similar lines to those outlined in previous reports. A number of varieties of sugar cane are being tested, as well as varieties of corn and other farm crops. The live stock kept at this station has done well on native pasture, requiring only a small amount of additional feed. No permanent improvements have been undertaken, awaiting a decision as to whether or not this is to be made a sugar farm in fact. It is hoped that sufficient funds may be secured to develop the farm properly.

ILAGAN TOBACCO STATION.

On January 1, 1910, Mr. Charles A. Mahan was appointed tobacco expert and sent to the Cagayan Valley for the purpose of taking charge of the tobacco station. An appropriation of ₱6,000 having been made for the buildings and fencing, the Bureau of Public Works was requested to proceed with the construction of same. In the meantime, Mr. Mahan occupied his time by collecting such data as he could from the tobacco growers, and planning the work for the coming year.

DIVISION OF ANIMAL INDUSTRY.

This division includes the veterinary control work, the production of serum at the serum laboratory, the Alabang and Trinidad stock farms, and all other general investigations in animal industry.

CONTROL WORK.

During the year the veterinary corps has been thoroughly organized and substantial progress has been made toward the complete eradication of animal diseases from these Islands. Three factors are mainly responsible for the satisfactory results that have been obtained, viz, a large increase both in the veterinary force and in the available means for carrying on this work; the interest taken in the work, and the hearty co-operation given by Insular, provincial, and municipal officials; and the enactment and enforcement of provincial resolutions and municipal ordinances for the control and eradication of contagious animal diseases.

At the beginning of the year twenty-one veterinarians were on duty in this Bureau, all of whom were employed in veterinary work, except Dr. C. M. Morgan, who was in charge of the Trinidad stock farm. During the year four veterinarians resigned, one returned to the United States on leave of absence, and twenty-five were appointed and reported for duty. An average of thirty-nine veterinarians were on duty in the Bureau throughout the year. Of this number one was detailed for the entire year as superintendent of the Trinidad stock farm and for a part of the year one was detailed as acting superintendent of the Alabang stock farm. During the year an average of eight agricultural inspectors, six American inoculators, and fifty-six Filipino inoculators were employed in veterinary work.

Most of the attention of this division during the year has been directed toward the eradication of rinderpest, though the control of other contagious diseases has not been neglected.

RINDERPEST.

This disease has been present in 27 provinces and 229 municipalities. It has been eradicated in 15 provinces and 204 municipalities, and is now present in only 12 provinces and 25 municipalities. There have been but two serious outbreaks of rinderpest during the year; one in the Province of Batangas, the other in the Province of Occidental Negros. Six thousand and fourteen carabaos and 4,052 cattle have been found suffering with this disease; 4,768 carabaos and 3,108 cattle have been reported as having died with rinderpest; 63,325 inoculations of antirinderpest serum have been made, of which 4,025 were reinoculations; 1,350 deaths after inoculation have been reported.

In addition to the fact that the field force during the year has been more than twice as large as that of the previous year,

two other factors have been responsible also in a considerable degree for the results that have been obtained in the eradication of rinderpest. His Excellency the Governor-General has taken great interest in this work and by means of executive orders, by suspension of inactive municipal officials, and in other ways, has awakened a most helpful coöperative interest among both provincial and municipal officials, which in many cases has been noticeably lacking in former years. Constabulary soldiers have been used to a much greater extent than formerly. Wherever used they have aided very greatly in the suppression of outbreaks of disease. The inefficiency of the municipal police in maintaining quarantines has always been a serious obstacle to the obtaining of satisfactory results in the field work. Without exception employees of this Bureau who have been aided in their work by the Constabulary have reported their services as being very satisfactory. The maintaining of absolute quarantine is really the keynote of rinderpest eradication. In an unfenced country like the Philippines absolute quarantine is usually an impossibility, but in most cases it has been observed that the nearer perfect the quarantine system has been maintained the shorter has been the outbreak in any particular province.

Fairly satisfactory provincial resolutions and municipal ordinances have been enacted in a number of different provinces and municipalities during the year, and in many cases have been well enforced. The importance of every province and municipality in the Islands enacting resolutions and ordinances for the control and eradication of contagious animal diseases can hardly be overestimated. Inasmuch as provincial boards and municipal councils seldom take action in this matter, unless urged and assisted by an employee of this Bureau, it is desirable that most of the time of at least two employees be devoted to this work.

SURRA.

This disease has been quite widespread during the year. It has been found in 29 provinces and 106 municipalities. At the end of the year but 12 provinces and 15 municipalities were reported as infected with surra. Because of the special campaign that was being waged against rinderpest the efforts directed against surra have been more along the line of control than eradication, and in only two districts—Marinduque and Bohol—has a systematic, though limited, campaign of eradication been carried on. During the year 148 animals were found infected

in 7 municipalities, of which number 106 were carabaos. The coöperation of the people has been excellent and it is believed that this disease can be entirely eradicated during the coming year. The fact that so many carabaos in the two provinces above mentioned harbor the infection has made the problem of eradication particularly difficult. On the Island of Marinduque both the officials and the people have opposed the work. Executive influence was brought to bear upon the officials of this subprovince during the latter part of the year and there is now being shown more satisfactory interest in the work so that it is believed the disease may soon be eradicated.

In coöperation with the Bureau of Science experiments have been conducted with a view to finding a satisfactory and practical cure for surra in large animals. While some horses and cattle were cured, the length of time required and the high death rate among those treated, has led to the conclusion that no methods of cure have yet been discovered which are of any considerable practical value for field work.

HEMORRHAGIC SEPTICEMIA.

This disease has been diagnosed in eight provinces, but only in one municipality (Palanig) has it been of serious consequence. It has been present in several municipalities in the Province of Pangasinan, but the death rate has not been large in any locality. This disease usually takes the form described in the text-books as "deer and cattle disease" or "barbone." It usually affects carabaos and cattle under one year of age, and is known by the Filipinos as "gartillo."

FOOT-AND-MOUTH DISEASE.

This disease, which was so widespread in these Islands during the previous fiscal year, has been present, with the exception of a few enzoötic cases, only in the ports of entry, and at these places principally among cattle imported from Hongkong and held on lighters.

QUARANTINE SERVICE.

Quarantine stations have been maintained at Manila, Iloilo, and Cebu, but only at Iloilo has there been a Government corral available.

During the first eleven months of the year all imported cattle and carabaos found on arrival diseased, infected, or exposed to infection, were held on lighters in the bay and not allowed to land except for immediate slaughter. On June 1, 1910,

General Order No. 15, modifying General Order No. 13, was issued and no animals known to be diseased have since been allowed to land. The issuing of General Order No. 15 is one of the most important measures ever adopted in connection with this work.

MANILA QUARANTINE.

A total of 106,228 animals have been inspected on arrival, of which number 42,942 were imported animals, and 18,554 animals have been inspected and shipping permits issued for their removal to the provinces.

The trade in imported cattle has been characterized by the small number of ports of embarkation. The major portion of the cattle were embarked at Pnom Penh (Indo China) and Hongkong. All of the carabaos, with the exception of a single animal, were embarked at Pnom Penh. All imported animals arriving at this port during the year, with the exception of those embarked at Hongkong, were apparently free from any infection on arrival. With the exception of three shipments, consisting of 142 head, all cattle arriving from Hongkong were either infected or considered exposed to infection and held upon lighters in the bay.

Due to the fact that all imported cattle were quarantined on lighters in the bay and were not allowed to come ashore except for immediate slaughter, conditions in the cattle corrals in Manila, as well as in Iloilo and Cebu, have been incomparably better than in former years. During the fiscal year 1909, 3,779 cattle and 614 carabaos, representing 56 separate lots, were infected in Manila with rinderpest or foot-and-mouth disease. Because of the prevalence of disease a great number of infected cattle and carabaos were shipped to the provinces, there to disseminate disease. During the fiscal year 1910 only 441 cattle and 2 carabaos, representing 9 lots, were infected in the city of Manila, and it is not believed that any infected animals were shipped to the provinces. The number of new outbreaks in the provinces receiving cattle and carabaos from the ports of entry have been noticeably fewer during the year just passed than in former years.

ILOILO QUARANTINE.

At this place 17,282 animals have been inspected on arrival and 7,988 animals inspected for shipment and certificates given for the removal to the provinces. The Government quarantine corral was opened about September 1, 1909, and has been in use since that time. While the number of animals arriving

for quarantine has been greater than the normal capacity of the corral, they have all been accommodated and the corral has been of much service. It is arranged that the capacity of this corral be doubled as soon as possible.

CEBU QUARANTINE.

Here, as in Manila, animals have been quarantined in the owners' corrals. A Government quarantine corral is badly needed in Cebu and such a corral should be completed at the earliest possible date. Four thousand one hundred and sixty-two animals have been inspected on arrival in this port and 666 animals inspected for shipment and certificates given for their removal.

MATADERO INSPECTION.

This division has had charge of the veterinary inspection at the Manila matadero during the year. Ninety thousand seven hundred and forty-one animals were inspected ante-mortem and 89,696 post-mortem; 23 were condemned on ante-mortem inspection and 875 on post-mortem inspection; 69,431 parts of carcasses were condemned as unfit for human consumption.

SAN LAZARO IMMUNIZING STATION.

This station has been greatly improved by the reconstruction of three sheds and other minor repairs. It has been used as a station for immunizing cattle and carabaos for the general public and animals intended for the serum laboratory at Alabang, also as a depository for animals being held for shipment to Alabang or to the provinces and for vaccine calves for the Bureau of Science. A few animals suspected of glanders and surra have been quarantined at this station pending diagnosis.

SERUM LABORATORY.

The most noteworthy feature of the years' work has been the large increase in the production of serum, with the attendant additions and improvement of facilities for handling this increase. The degree of extension is shown by the fact that the number of serum cattle on hand at the end of the year is 524, while the number on hand for the corresponding day of last year was 154.

To accommodate the additional herds and to provide the necessary facilities for the increased amount of work, numerous additions and improvements have been made at the serum laboratory, the more important of which are the following: The con-

struction of two new sheds housing 64 animals each, remodeling the old dairy shed, the construction of a new isolation shed for virulent blood animals, the construction of houses for laboratory foreman and student assistants, the installation of a new vacuum plant and a 500-gallon water tank, the laying of larger water mains and supply pipes, and the installation of a windmill over the second artesian well.

The total production of serum for the year has been 10,145.8 liters (30,437.4 bottles). The production of serum increased from 507 liters in July, 1909, to 1,417.3 liters in June, 1910. There has been an almost constant increase in production throughout the year. Bleeding was discontinued for a week during November, during which time more ample facilities for the filtration work were being installed at the Bureau of Science. The total amount of blood drawn during the year has been 25,175.7 liters, the percentage of separation of serum being 40.28 per cent. This percentage of separation of serum from coagulum is the largest that has yet been obtained in this work. There has been a remarkable gain in percentage of separation during each of the past four years, as shown by the records of 22.7 per cent, 28.6 per cent, 38.38 per cent, and 40.28 per cent, respectively.

No material modifications have been made in the method of serum production. The process has been hastened somewhat by the shortening of the period between the third bleeding and subsequent inoculation to a minimum of four instead of seven days; the production of peritoneal fluid has been improved as to technic with a result that abscess formation at points of inoculation has been materially reduced. At the present time experiments are in progress to determine the advisability of abandoning the hyperdermic inoculation of the last (largest) hyperimmunizing doses of virus, and introducing these doses intraperitoneally. The advantages of the intraperitoneal method are that it is less painful and therefore results in less shock to the animal; the operation can be performed in a fraction of the time necessary for the hyperdermic injections; it should obviate to a great extent the considerable hospital lists due to abscess formations, and in the comparative immunity of the animal to peritonitis. No unfavorable symptoms have thus far been observed in the animals so treated.

The following have been the types of animals used in the production of serum: Indo Chinese, 456; Chinese, 117; Indian, 75; native, 59; carabaos, 10; total, 717. It will be observed

that a large proportion of the herd has been made up of the Indo Chinese cattle. Nearly all of these have been imported from Cambodia, which province produces much better cattle than Annam and Phuyen, the sources from which our serum cattle were occasionally drawn formerly. Fifty Indian steers and 25 Indian bulls have been carried in the herd for several months, but have not proven very satisfactory. All of these Indian cattle will be eliminated from the herd as soon as suitable animals can be obtained in their place. Native cattle have been purchased whenever animals of fair size and type were available. A few good individuals have been obtained but the majority have been too small. On the whole the effort to use native stock has not been very successful as they are wild, difficult to handle, do not respond well to stall feeding, and because of small size and unsatisfactory condition can be bled only 2 liters or less. The carabaos were admitted to the herd for experimental purposes and have proven quite satisfactory.

A total of 402 animals were used in the production of virulent blood, 381 of which were also used for the preparation of the peritoneal fluid. The total production of virulent blood has been 2,510.35 liters and of virulent peritoneal fluid 2,677.75 liters. A large percentage of these virus-supporting animals have been obtained from the Batanes Islands, and they are unquestionably the best available animals for the purpose.

The total losses of all classes of animals during the year have been as follows: Serum, 40; virulent blood, 40; completed, 1; serum native, 9; carabaos, 2; and vaccine, 7. The losses by rinderpest have been very small during the year. Foot-and-mouth disease, which in former years interfered most seriously in serum work, has not been an important factor this year. Surra has been discovered in many of the cattle. Special effort has been made to eliminate this disease so far as possible, but the problem is a difficult one.

The following classes of fodder have been used at the serum laboratory during the year: Rice straw, sorghum, zacate, guinea grass, crushed feed, rice meal, bean meal, bran meal, corn meal, mixed feed, sugar cane, and corn stalks. In the future the hay ration will be seldom used as it seems probable that sufficient sorghum and other green fodders will be available. Some difficulty has been experienced in maintaining all the animals in satisfactory condition. At the end of the year, however, the entire serum herd, with the exception of the native cattle, was in very good condition.

ALABANG STOCK FARM.

The Alabang stock farm was in charge of Mr. H. J. Gallagher from the beginning of the fiscal year until April 1, 1910. Dr. H. F. Hungerford has been acting superintendent during the remainder of the year.

Climatic conditions at this farm have been generally favorable during the year.

The supply of labor has been abundant, but the quality is far below the standard, probably for the reason that most of the young men in this vicinity go to Manila, leaving chiefly young boys and older men to work on the farm. Most of the laborers live from 2 to 3 miles away, which is a great disadvantage. It is desirable that all of the labor be housed on the farm. The average pay of the ordinary day laborer is about 60 centavos per day.

During the past year many improvements have been made, among the more important of which are the following: The rebuilding of the main roads from the railway station to the farm and serum laboratory, the construction of a new machinery shed, bodega, hog shed, and several houses for laborers. About 33,000 meters of wire fencing have been built during the year.

About 12 hectares of new land have been put under cultivation during the year. Most of this can be reached by irrigation and promises to give excellent results. With an increased water supply there is much more good land on this farm than can easily be put under cultivation. The total amount of land now under crops is approximately 30 hectares.

A number of fertilizer experiments have been carried on during the year, particularly with sugar cane. The best results have been obtained with a mixture of double superphosphate and tobacco dust. Good results have also been obtained with a mixture of tobacco dust, tankage, bone charcoal, and muriate of potash.

During the months of August and September the farm was twice visited by locusts, but fortunately the numbers were not great and beyond the damaging of some experimental rice no harm was done.

Corn has been damaged to some extent by a green worm, but other than these two, the farm has been exceedingly free from insect pests. The principal crops grown during the year have been "Mexican June" corn, sugar cane, sorghum, guinea grass, and para grass. The corn, although attacked to some extent by a green worm, gave a fair yield of excellent forage. The sugar

cane was planted late but yielded a good heavy cane about 10 or 12 feet long, which furnished a supply of cuttings for re-planting, and forage for pigs and cattle. Sorghum may well be considered the standard forage crop for this part of the country. Several fine crops of sorghum have been obtained. Considerable difficulty has been experienced in previous years in growing guinea grass satisfactorily at this farm. A determined effort was made during the past year to grow it successfully, with the result that it has given heavy yields of forage. Para grass, although not as heavy a yielder as guinea grass, has done well.

There has been a marked improvement in the condition of all live stock at the farm during the year. This may be ascribed to better conditions under which the stock is now being handled, to the improvement in the pastures, and to the fact that the animals are gradually becoming more acclimated and used to their surroundings. An outbreak of surra resulted in the loss of a number of our mares. In connection with this outbreak, experimental work was carried on in the treatment of this disease and a number of animals were saved. These are now in first-class condition. At the present time we have on hand a total of 74 horses, 48 of which are mares, and 26 stallions. Practically all of the 3- and 4-year-old stock have been broken for saddle use, and three teams of young mares are being trained in harness.

The Australian dairy herd was disposed of during the year. Since the sale of the dairy herd we have left on hand a herd of cattle chiefly Chinese and Galloway-Chinese crosses. This cross has the advantage of being larger than the original Chinese stock, remains in good condition both during the wet and dry seasons, and seems to be entirely suitable for this country.

These cattle have passed through the entire year without food other than the natural grasses of the range, and are now in first-class condition.

The hogs on the farm have kept in excellent condition throughout the year, and the demand for breeding animals has been much greater than we have been able to supply.

Guinea pigs and rabbits are still being raised in limited numbers and at high cost. The guinea pigs breed only in small numbers, probably due in part to the constant in-breeding. The rabbits appear to do little better under the open-run conditions than they did formerly in cages.

An effort is being made to put this farm, as far as possible, on

a self-supporting basis and with this end in view more land is constantly being put under cultivation. At the present time the forage crops will more than pay for the cost of the actual agricultural operations.

TRINIDAD STOCK FARM.

This farm remained in charge of Dr. C. M. Morgan until April, 1910, at which time Dr. David McKibbin, jr., was detailed as acting superintendent and Doctor Morgan given leave to return to the United States.

The rainy season this year was the most severe which has ever been experienced and was marked by two severe storms which occurred in July and October. The Trinidad Valley became flooded and resulted in the loss of several head of live stock belonging to the farm and to private parties, and in some injuries to the pasture there.

The areas devoted to breeding pastures in this valley have been increased by adding a separate inclosure on the west side next to the stock farm and used largely for native mares brought in during pregnancy to be bred after foaling. Twenty mares belonging to private parties have been bred in this way. This system has proved the most successful of any so far used.

Other improvements have been made by extensive repairs to the American horse barn, the erection of three cattle sheds, building $3\frac{1}{2}$ kilometers of good fence, and the planting of small areas to oats, corn, and paspalum grass. About 16 hectares of land, subject to irrigation, was leased near the Trinidad farm and planted in corn and sorghum to be used as forage crops. Some green forage was also produced on the Trinidad farm. This has materially reduced the cost of maintenance of animals on the stock farm.

The stock on hand at the end of the fiscal year consisted of 53 horses and mares, 3 mules, 84 head of cattle, 8 goats, and 8 head of sheep. The increase in the live stock by birth has consisted of 25 colts and 20 calves. The death rate among the stock on the farm has been very small, and most of those that occurred were due to accidents and to exposure during the heavy typhoons.

The greatest progress in the production of live stock on this farm has been made in the breeding and rearing of colts sired by Arabian stallions, and out of native mares. The first one of these colts raised on the farm reached maturity and has been broken for work during this year. There are on hand five 2-year-olds, which are very promising, and about twenty-five yearlings,

from which we will no doubt obtain some exceptionally fine horses of this type. These are the most promising colts of any type so far bred by this Bureau. It is contemplated that in the future horse breeding at this farm will be limited largely to the production of this type.

Cattle continue to thrive well on this farm, especially since land in the Trinidad Valley has been available for pasture during the dry season.

The grade herd of Galloway and native crosses continues in excellent condition, and further demonstrates the desirability of this type of cattle for similar conditions throughout the Philippines.

The herd of Hindu cattle sent to this farm has not done nearly so well as the native and grade cattle, and their removal to a lower altitude, where there is less rain and a higher temperature, is contemplated in the near future.

The Angora goats kept here are doing fairly well, but require careful attention and housing, as they suffer severely from exposure during the heavy rains with resulting low temperatures.

Sheep have also done only fairly well and require better care and attention than would be practicable on a sheep ranch.

Very respectfully,

G. E. NESOM,
Director of Agriculture.

The honorable,
the SECRETARY OF PUBLIC INSTRUCTION,
Manila, P. I.

GENERAL ORDER NO. 18.

DEPARTMENT OF PUBLIC INSTRUCTION,
BUREAU OF AGRICULTURE,
Manila, P. I., December 10, 1910.

GENERAL ORDER }
No. 18. }

In view of the fact that rinderpest and foot-and-mouth disease have recently occurred among cattle from Hongkong while in quarantine on lighters in Manila, and by authority of Act 1760 of the Philippine Commission, section 2 of General Order No. 15 is hereby canceled and superseded by the following regulations:

1. If cattle, carabaos, sheep, goats, or swine brought to the Philippine Islands from any foreign port considered and declared by the Director of Agriculture to be infected with dangerous communicable animal disease arrive apparently free from such disease, they will be permitted to land ninety days after their departure from the port of origin, provided no disease has appeared among them during this period. Permission will be given for the transfer of such animals from the vessel on which they arrive to lighters, cascos, or other suitable vessels, where they will be held until the above-mentioned ninety days shall have elapsed; or, if any such animal disease appears until they have been free from disease for a period of ninety days, when they may be brought ashore.

2. The provisions of this General Order shall become effective December 20, 1910.

G. E. NESOM,
Director of Agriculture.

Approved:

NEWTON W. GILBERT,
Secretary of Public Instruction.

FORMS USED FOR QUARTERLY REPORTS UPON CROPS AND LIVE STOCK.

The crop and live-stock reporting forms sent to correspondents have been modified from time to time as experience has shown where they could be improved. A considerable change was made in them effective for the fiscal year beginning July 1, 1910; they having been increased 50 per cent in size and the questions so amplified as to eliminate as far as possible any chance for a misunderstanding on the part of those filling them in. Act No. 1898, "*An Act providing that municipal presidents shall make special quarterly reports on the condition of agriculture, live stock, and on other matters in their respective municipalities,*" went into effect July 1, 1909, and the first year of its operation showed a considerable gain over the preceding year in completeness and accuracy of the reports received.

Appended is the new blank form. These forms are sent to the presidents of municipalities, townships, and *rancherías*. Each question is printed in English and Spanish but to reduce the size only the English is given here:

B. A. FORM No. 28.

DEPARTMENT OF PUBLIC INSTRUCTION. BUREAU OF AGRICULTURE.

QUARTERLY REPORT UPON CROPS AND LIVE STOCK.

Municipality of, Province of
..... Quarter, months of, 19

GENERAL QUESTIONS.

1. What crops, if any, have been injured by drought, excessive rains, or winds?
2. What crops, if any, have been injured by insects, such as locusts, etc., rats, or by blights?
3. Give names, in the order of their importance, of the five principal crops grown in your municipality
4. Give names, in the order of their importance, of some of the crops of minor importance grown in your municipality

LIVE STOCK.

Questions.	Horses.	Cattle.	Carabaos.	Hogs.	Goats.	Sheep.
5. Number in municipality at the beginning of the present quarter.....						
INCREASE.						
6. Increase because of births.....						
7. Increase because of receipt from other municipalities, by purchase or otherwise.....						
8. Grand total.....						
DECREASE.						
9. Number of deaths from disease.....						
10. Nature of disease causing deaths (par. 9).....						
11. Number of deaths from old age.....						
12. Decrease because of transfer to other municipalities because of sale or otherwise.....						
13. Number of deaths by accident.....						
14. Number slaughtered for food in the abattoir or other places.....						
15. Decrease from all causes.....						
16. Number in municipality at the end of the present quarter.....						
17. What is the average local value of each of the following animals?						

Remarks:

.....

.....

.....

.....

.....

Questions.	Palay. ¹	Sugar cane.			Tobacco.	Corn.
18. If at the beginning of the present quarter land was under cultivation which had been sown (but not harvested), state how many hectares.						
19. If during the present quarter new land has been put under cultivation, state how many hectares have been sown.						
20. Add the number of hectares sown during the present quarter to those under cultivation at the beginning of the quarter (question No. 18) and give the grand total.						
21. What is the condition of the growing crops?						
22. If during the present quarter some of the land under cultivation has been harvested, state how many hectares.						
23. Deduct the number of hectares harvested from the grand total under cultivation (par. 20) and state how many hectares are still under cultivation.						
	Liters.	Marketable form.			Kilos.	Liters.
		Sugar (kilos).	Panocha (kilos).	Basi (liters).		
24. State what has been the total quantity harvested (in weights or measures as indicated in the following columns) during the present quarter.						
25. What quantity of these products is held by planters and local dealers at the end of the present quarter?						
26. What is the present local value of the products, i. e., those grown in the municipality?	Palay (per liter).	Sugar (per kilo).	Panocha (per kilo).	Basi (per liter).	Per kilo.	Per liter.

¹ In answering questions 25 and 26, where hulled rice is given as a unit of measure, the word "rice" should be written over the quantity given.

NOTE.—75 liters=1 cavan; 63.25 kilos=1 picul; 46 kilos=1 quintal.

Questions.	Hemp.	Ma-guey.	Coconuts.				Coffee.	Cacao.
27. If at the beginning of the present quarter land was under cultivation (planted before that time), state how many hectares			Entire number of trees.					
28. If during the present quarter new land has been put under cultivation, state how many hectares have been planted			Entire number of trees.					
29. Add the number of hectares planted during the present quarter to those under cultivation at the beginning of the quarter (question No. 27) and give the grand total			Entire number of trees.					
30. What is the condition of the growing crops?								
31. If during the present quarter some of the land under cultivation has been harvested, state how many hectares			Entire number of nuts.					
32. If during the present quarter some of the plants or trees have ceased bearing, state the number of hectares which they covered			Entire number of trees.					
33. Deduct the number of hectares from which the plants or trees have ceased bearing from the grand total under cultivation (par. 29) and state how many hectares are still under cultivation			Entire number of trees.					
	Kilos.	Kilos.	Marketable form.				Kilos.	Kilos.
34. State what has been the total quantity harvested (in weights or measures as indicated in the following columns) during the present quarter			No. of nuts.	Copra (kilos).	Oil (liters).	Tuba (liters).		
35. What quantity of these products is held by planters and local dealers at the end of the present quarter?								
36. What is the present local value of these products, i. e., those grown in the municipality?	Per kilo.	Per kilo.	Per nut.	Copra (per kilo).	Oil (per liter).	Tuba (per liter).	Per kilo.	Per kilo.

NOTE.—63.25 kilos = 1 picul; 11.5 kilos = 1 arroba.

Remarks:

.....
Municipal President.

I hereby certify that the municipal council approved this report in resolution No.:

.....
Municipal Secretary.

MONTHLY VETERINARY REPORTS—NOVEMBER.

RINDERPEST.

Iloilo.—At the beginning of the month of November, there were four barrios infected with rinderpest in the municipality of Miagao. One of these barrios had been infected for five months, two for three months, and one for one month. The animals in one of these barrios had been injected with serum seven times, in two barrios five times, and in one barrio once. Owing to this fact, it was decided that other measures than use of serum and ordinary quarantine were necessary to eradicate the disease. About the middle of November all the animals in these barrios were tied with short ropes, in groups of not more than ten animals in each group, and the police and Constabulary were directed to inspect and count these animals twice daily. The success obtained by this method of quarantine has exceeded all expectations as there has not been a single case of disease in any of these barrios since these measures were introduced.

Cebu.—During the month seven animals became infected in five municipalities.

Pangasinán.—Rinderpest exists in four municipalities and while there are not many cases, it will be difficult to entirely eradicate the disease without increasing the field force in this province.

Tarlac.—A thorough and systematic quarantine is being introduced by which it is hoped that rinderpest will be held in check and danger of its introduction from neighboring provinces greatly lessened. The provincial authorities are actively co-operating with the veterinarians of the Bureau of Agriculture.

Zambales.—No cases of rinderpest have occurred during the month and a quarantine is being maintained against infected provinces.

Nueva Ecija.—During the month rinderpest has been completely eradicated in two municipalities and but one infected municipality now exists in the province. The effective quarantine maintained by the Constabulary greatly aided in obtaining these results.

Oriental Negros.—It has been found very difficult to check the spread of rinderpest reported here last month owing to the fact that stock owners and municipal officials have been rather slow in coöperating in the work of constructing the necessary corrals in which to quarantine the animals affected.

Leyte.—Rinderpest is decreasing in this province.

MONTHLY CROP REPORTS—NOVEMBER.

RICE.

Cagayan.—In the rice-growing districts of this province the harvesting has been somewhat retarded, and much of the crop damaged by the recent rains and floods.

Ilocos Norte.—From information at hand the rice crop of this province for the present year will be larger, and of a superior quality to that for the year 1909. The municipality of Bangui on account of having numerous rivers, which afford natural systems of irrigation, contains some of the largest tracts of rice land in the Province of Ilocos Norte. There are, however, large tracts of good land in this municipality that, for the lack of irrigation, are at the present time uncultivated, but they could be converted into valuable land by the establishment of a good irrigation system. This municipality has 279 hectares of upland, and 2,474 hectares of lowland rice under cultivation which promises a larger crop per hectare than that of the preceding year.

Ilocos Sur.—The upland rice called "lampadan" has been harvested, and has yielded a fair crop. The condition of the lowland rice, which is now growing, is unsatisfactory in places having no irrigation. The farmers in the municipality of Santo Domingo state that their rice is affected with a kind of rust. The crop will be below the average.

Mountain Province.—Rice harvesting is practically over in the different sections of this province; the crop being very good in both quantity and quality. The Igorots are now busy repairing the old walls of their rice fields, and building new ones; a work that is necessary each year. As usual the crop of rice in the municipality of Bontoc is not sufficient for the needs of the people, so that much will be brought in from northern Bontoc and Kalinga.

Nueva Ecija.—It is estimated that the rice crop throughout the province will be about 30 per cent short of a normal crop. This is due to the fact that the rains came too late. Palay now sells at ₱3 per cavan.

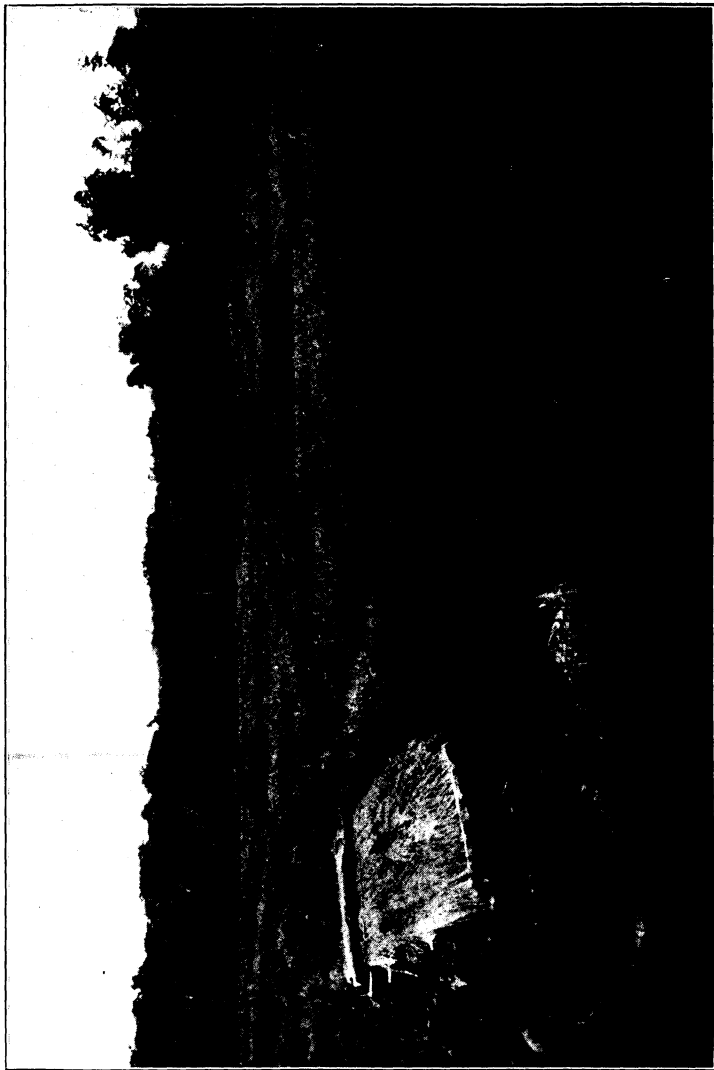


PLATE VIII.—FIELD OF UPLAND RICE AT LAMAO EXPERIMENT STATION.

Tarlac.—Rice has been damaged to some extent by the lack of rain during the past few months, but it is impossible at the present time to estimate the extent of this damage. Rice is now being harvested, and the work of harvesting will continue during the month of December. Large tracts of rice land are now lying idle in the province because of the shortage of labor, and lack of facilities for irrigation.

Zambales.—Rice harvesting has been the principal work of the farmers throughout the month. In all parts of this province nearly all available labor is employed in the rice fields. Most of the farmers report at least a normal crop; a number report a better crop than last year. There is some especially good rice in Zambales this year, but this part probably does not represent one-tenth of the area planted to rice. There is a very marked difference in the crop on the fields immediately adjoining, where the same seed was used, and where soil conditions were apparently the same. This difference seems to be due entirely to the time of planting.

Tayabas.—In some places where upland rice is raised there will be a shortage of the crop, but this affects few municipalities and is of such small quantity as not to be of importance. The lowland rice crop will be as good as usual.

Ambos Camarines.—Reports from the Partido de Lagonoy, including the municipalities of San Jose, Goa, Lagonoy, Tigaon, Sagnay, and Caramoan indicate that an unusually heavy rice crop will be harvested in a few weeks. More land than usual, in fact all that was suitable for the purpose, was planted in rice this year. The crop has not been molested by rats or locusts.

In the Bicol River and Libmanana sections of the province the rice crop was retarded very much by the late rains, and is about two months behind last year's crop. More land than usual has been planted in most parts of this district, particularly in Bula and Minalabag, and the present condition of the crop is at least up to the average.

The mountain rice crop was unusually heavy this year and has been nearly all harvested. Small patches of it were damaged in some sections of Minalabag and Lupi by the locusts, but the loss compared to the total area planted was insignificant.

The price of rice has advanced considerably here during the past two months and it is estimated that more than ₱50,000 worth of it was received during October at Nueva Caceres alone. This is a rather bad showing for what is perhaps the richest and one of the largest rice-growing sections in the Islands.

Albay.—Rice harvesting has commenced in this province. In the municipalities of Oas, Polangui, and Libon an insufficient supply of water has been a source of worry to the farmers and the rice in some places is poor in quality and turning yellow. Late rains, however, have helped the situation. Altogether the rice crop is the largest in years.

Marinduque.—There have been frequent rains during the month of November, and many of the farmers are now preparing their land for rice planting.

Bohol.—The rice and corn crops do not promise to be as good as last year on account of the heavy rainfall. The damage done by locusts has been little up to the present time in comparison with that which was done last year.

Cebu.—A large part of the rice crop in the northern part of the island was destroyed by the typhoon early in the month, but little damage was done in the main rice-growing section of Carcar.

Iloilo.—Most of the young rice is in excellent condition even though it was planted late. The weather has been very favorable for rice during the month of November. The young rice did not suffer from the last typhoon, but that which was in bloom, and approaching maturity, suffered severely.

The harvesting of the rice crop has been the principal agricultural work done in this province during the month of November. On December 1 this work was practically completed in almost all parts of the province. About 75 per cent of the usual harvest is expected.

Capiz.—The harvesting of rice has been going on throughout the month, and the farmers report that the crop is short by a third.

Occidental Negros.—The rice crop in Siaton and Bayauan will be shorter than usual on account of late planting.

Surigao.—The planting season is just now beginning and conditions are very favorably for the work.

Cotabato.—The harvesting of an exceptionally large rice crop was commenced during the latter part of October, and some 200 sacks were recently shipped from Cotabato.

ABACA (MANILA HEMP).

Ambos Camarines.—The “Partido de Lagonoy” is the heaviest abacá-producing section in this province, but the price of abacá has been so low—10 centavos per kilo—that the growers are badly discouraged and are devoting all of their time in trying to raise some other crop and are stripping as little abacá as possible.



PLATE IX.—THRASHING OUT RICE AT LAMAO EXPERIMENT STATION.

SUGAR CANE.

Nueva Ecija.—The area planted to sugar cane in this province has been doubled the past season, and the growing crop is now in good condition.

Tarlac.—Sugar cane is grown in different parts of this province not extensively, but in sufficient quantities to indicate that Tarlac might be made a sugar-producing province of importance. The cane throughout the province is in good condition. It is believed that the farmers in this province should be encouraged to plant more sugar cane and, that in some cases, land that is now planted to rice would give better results if planted to cane.

Cebu.—The sugar cane of Cebu is in promising condition and the prospects are that there will be a large crop. An inspection of the territory from Carmen to Argao indicates that the sugar crop for this year will be larger than that of last year. The appearance of the cane fields, however, is not what it should be for the reason that some of the fields were planted late and in most cases the cane was planted too close and did not receive proper cultivation. Farmers in this section prefer the small short cane because such cane is more easily crushed in their small wooden mills and also the juice from the small cane is more concentrated and yields a better grade of sugar.

The cane fields of Carcar and Talisay are in good condition as compared with the fields in other towns along the line of the railway. The typhoon apparently did not do much damage to the cane fields. Only one field was observed that had suffered to any considerable extent from the typhoon.

About 85,000 piculs of sugar are expected for this year's crop. At present the yield per hectare is not more than 40 piculs. With proper methods of cultivation such as the use of good plows, fertilizers, and irrigation the same land could be made to produce from 70 to 90 piculs per hectare.

Irrigation would be practicable in many places in the Province of Cebu as there are many streams from the mountains that cross the lowlands.

There is great need at the present time for the establishment of a modern sugar central in Cebu. If such a central were to be established a large part of the cane could be transported from the fields to the mill by the railroad, as 90 per cent of the 85,000 piculs above referred to, is produced on an area all of which is within 2 kilometers of the railway line.

Iloilo.—Large areas of sugar cane were damaged in the municipalities of Barotac Nuevo, and Dingle, by the flood and typhoon early in the month. Some of the farmers had begun to mill their cane, but were obliged to stop on account of the heavy rains.

Capiz.—Sugar cane in the southern part of the province was damaged to some extent by heavy rain storms early in the month, but, as it is now near the milling season, it is not believed that there will be any great loss. The farmers were making preparations during the first part of the month to mill their cane.

Oriental Negros.—There has been a little too much rain in this province for the sugar cane. There will, however, be a good crop.

Occidental Negros.—The present outlook for sugar is excellent.

Surigao.—There are a few small sugar haciendas in the municipality of Surigao; these haciendas produce sugar for local consumption only.

Cotabato.—From Tamantaka to Tumbao, and along the Tamantaka River, considerable sugar cane is being cut by the Moros. The cane is large and of very good quality. It is believed that only about 40 per cent of the juice is obtained, owing to the crude wooden mills used by the Moros for crushing the cane.

COCONUTS.

Tayabas.—The increased production of copra, due to the better care now given the coconut plantations, and the fact that young trees are now coming into bearing; and the continued good prices received for copra, so affect general conditions in this province that a shortage of other crops seems to produce no impression on the general economic conditions. Former pasture lands and waste places are now being planted to coconut trees.

TOBACCO.

Agayan.—Tobacco is a fair average crop, although much of it was damaged by the typhoon in September, and by the flood of the past week.

Cotabato.—In the vicinity of Pakit, and along the upper Rio Grande a very good grade of tobacco is grown. The leaves are large and well formed, and, although practically uncured are made by the Filipinos and Moros into very fair cigars. It is believed that if the Moros were taught to properly cure and cultivate their tobacco a very good quality could be produced.

CORN.

Agayan.—Corn is said to be somewhat better than last year.

Bohol.—Corn was badly blown down by the typhoon of November 1 and 2, but there will not be a complete loss of the crop.

Cebu.—The corn crop of Cebu is not in a very promising condition, as a considerable amount of the growing crop was destroyed by the typhoon.

Iloilo.—In the southern part of the province a few hectares were planted to corn during the latter part of the month, and at the end of the month the people who were through with their rice harvesting were plowing their corn land.

Oriental Negros (Siquijor).—The principal crop on this island is corn. The fields are in bad condition at the present time, owing to the excessive rainfall. During the past few months it has been almost impossible to cultivate the fields, and the weeds have taken possession. Another drawback has been the scarcity of carabaos.

RUBBER.

Cotabato.—The new Rio Grande Rubber Company has purchased a considerable amount of gutta-percha, and instead of shipping it in its crude form, as do the Chinamen, have put in several washing machines, and are turning out a very good grade of clean gutta-percha.

Sulu.—The Lapoc Plantation Company now has planted about 15,000 rubber plants, as well as 1,000 coconuts. The larger part of the rubber is Ceara, which grows very quickly, more quickly in fact than the same plant in Borneo or Ceylon. Some of the Ceara rubber trees on this plantation were from 18 to 22 inches in circumference when two years old. The planters here report that catch crops such as peanuts, tapioca, corn, etc., do not pay, except as they help to keep a good supply of trained labor on the plantation. It can easily be demonstrated on paper how the revenue from catch crops will pay the running expenses of the plantation during the first few years. From practical experience, however, this does not seem to be the case.

CURRENT NOTES—NOVEMBER.

LOCUSTS.

Ambos Camarines.—There are still immense swarms of locusts in this province and they have greatly damaged some plantings of rice, though the loss has not thus far been considerable. On the 11th of November a large swarm of locusts appeared in the neighborhood of Nueva Caceres and it looked for a while as though they might destroy all the vegetation for miles around. The second company of Constabulary was turned out to help fight these locusts and was able to destroy a great many. The swarms soon left the district and did but little damage. There are vast areas of uncultivated land all through this section and it seems to be very easy to keep the locusts on this unused land where they can do no harm. If, however, they are breeding, as they undoubtedly are, it is probable that great damage will be done to next year's crops. It is extremely difficult to get the people to destroy the locusts except when they are paid for the work, and even then their interest is somewhat languid.

Locusts appeared in the Camarines Norte district during the month of October, but as the rice has not yet been planted there they have done no harm thus far.

Leyte.—There are still some locusts in this province, but the officials are taking hold and with the assistance of the people are making good headway for the extermination of this pest.

Capiz.—The locusts are about exterminated in the province and no further damage is being done by them.

Oriental Negros.—The locusts do not seem to have harmed the crops in this province at any time during the present year.

Cotabato.—The locusts that were present during the month of September have disappeared from this district.

FAIRS AND EXPOSITIONS.

Occidental Negros.—An agricultural exhibition will be held in Bacolod during the latter part of December. Exhibits of all the agricultural products of the province have been promised by different *hacenderos*. The best of these exhibits will be forwarded to Manila for the Carnival.

Marinduque.—Through the efforts of Mr. E. E. Baker, supervising teacher, it is planned to have an agricultural exhibition in connection with the coming fiesta at Boac, beginning on, or about, December 3. Cash prizes have been offered for the best exhibit in order to stimulate an interest in the project.

RANGE OF PRICES OF PHILIPPINE AGRICULTURAL PRODUCTS.

Highest and lowest prices of unhulled rice, abaca, copra, sugar, tobacco, and corn for the months of July and August, 1910.

[NOTE.—75 liters=1 cavan; 63.25 kilos=1 picul; 46 kilos=1 quintal.]

JULY, 1910.

Province.	Unhulled rice per 75 liters.		Abaca per 63.25 kilos.		Copra per 63.25 kilos.		Sugar per 63.25 kilos.		Tobacco per 46 kilos.		Corn per 75 liters.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
Agusan.....	2.75	2.20	12.00	10.00	8.50	7.50					4.50	1.50
Albay.....	3.00	2.40	11.50	5.89	11.00	5.00					4.00	1.50
Amboi Camarines.....	4.50	3.50	11.00	6.50	12.00	6.00	8.00	6.00			2.50	1.50
Antique.....	3.50	2.50	18.00	11.00	10.00	8.00	8.25	6.75	22.50	6.00	3.75	2.00
Bataan.....	3.50	2.25					8.00	6.00			4.00	2.00
Batangas.....	3.50	2.50	13.00	10.00			10.00	4.00	15.00	7.00	3.75	2.00
Bohol.....	3.75	3.00	15.50	8.25	12.00	7.00	9.48	4.50	25.00	4.14	5.00	2.50
Bulacan.....	4.00	2.40					9.00	7.75	18.00	9.00	2.50	1.50
Cagayan.....	5.00	2.75							19.78	15.00	6.00	2.50
Capiz.....	3.75	2.10	16.00	12.00	10.00	6.50	8.00	7.00	30.00	5.00	3.12	1.25
Cebu.....	3.00	2.50	17.00	16.50			9.40	5.25	12.00	12.00	3.87	2.00
Iloilo.....	5.00	2.50	15.50	9.50	11.00	7.00	9.50	6.00	20.00	4.00	5.00	2.00
Ilocos Norte.....	4.00	2.50					4.00	4.00	16.00	5.00	3.00	1.00
Ilocos Sur.....	4.50	2.25					7.00	4.50	30.00	4.50	5.00	1.00
Iloilo.....	4.00	2.00	14.00	12.00	10.00	5.00	9.00	5.50	22.00	5.00	3.00	1.50
Isabela.....	4.00	3.12							30.00	7.20	5.00	2.50
La Laguna.....	3.25	1.85	12.00	6.00	8.00	6.32	10.00	5.00			4.00	1.00
La Union.....	3.50	2.50			8.00	6.00	6.60	4.00	9.00	5.00	4.50	2.50
Leyte.....	3.75	2.00	14.00	6.95	10.12	6.00	10.00	5.50	30.00	4.60	4.50	2.50
Mindoro.....	4.00	2.50	15.00	9.00					12.00	5.25	5.00	2.50
Misamis.....	3.50	2.00	8.25	7.00	9.50	6.95	10.00	8.25			4.00	2.50
Moro.....	3.00	2.00	15.00	7.60	10.00	8.22			27.00	21.00	2.50	2.50
Mountain.....	6.00	2.50			6.00	5.00			18.50	2.50	6.25	1.00
Nueva Ecija.....	2.77	1.25					8.25	4.00	23.00	8.00	3.50	1.25
Nueva Vizcaya.....	4.00	3.12					10.00	5.00	21.50	11.00	3.75	1.70
Occidental Negros.....	3.25	2.50	16.00	8.00	11.00	6.50	10.00	6.50	31.00	6.00	3.75	2.00
Oriental Negros.....	5.00	2.50	12.60	7.70	12.00	7.50	10.00	6.75	25.00	5.00	5.00	2.50
Palawan.....	3.25	3.25										
Pangasinan.....	3.00	2.20					8.00	5.00	23.00	4.00	3.75	2.00
Rizal.....	3.75	2.00			9.50	5.00	10.00	4.00			4.00	1.50
Samar.....	3.12	2.50					10.00	6.00			5.60	1.00
Sorsogon.....	3.70	1.50	15.00	1.00					30.00	6.50	4.00	2.00
Surigao.....	3.75	2.00	12.00	6.33	9.00	5.50	7.60	7.60	30.00	6.00	3.50	1.50
Tarlac.....	2.75	2.20	12.00	10.00	8.50	7.50						
Tayabas.....	4.00	1.75	15.00	5.00	8.50	6.00	10.00	4.00	20.70	5.82	2.50	1.50
Zambales.....	3.25	2.00			8.00	7.00	10.00	7.50	12.00	5.00	5.00	1.40
	3.00						9.00	4.00	18.40	7.00	4.00	2.50

AUGUST, 1910.

Province.	Unbulled rice per 75 liters.		Abaca per 63.25 kilos.		Copra per 63.25 kilos.		Sugar per 63.25 kilos.		Tobacco per 46 kilos.		Corn per 75 liters.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
Agusan	3.00	2.20	12.00	8.50	10.00	8.00	8.00	6.30	22.50	6.00	4.00	1.50
Albay	3.50	2.50	10.00	5.20	12.00	4.00	8.00	6.00			4.00	2.00
Ambos Camarines	4.50	3.00	10.00	6.00	12.50	2.50	8.00	6.00			4.00	1.50
Antique	4.50	3.00	18.00	11.00	10.00	8.00	9.00	6.00			4.00	1.50
Bataan	3.50	2.25					8.00	4.00	15.00	6.50	4.00	2.00
Batangas	4.50	2.50	14.00	10.00		6.43	8.00	5.00	25.00	4.14	5.00	2.00
Bohol	4.00	2.50	16.00	8.25			9.48	7.00	18.00	9.50	2.55	2.00
Bulacan	4.00	2.50					9.50	7.00	19.75	7.00	3.00	2.50
Cagayan	5.00	2.50							30.00	6.00	3.75	1.50
Capiz	3.75	2.00	16.00	7.00	10.00	6.00	8.00	6.00			3.87	2.00
Cavite	3.00	2.60	16.00	15.00			9.00	6.00			3.00	2.50
Cebu	5.00	3.00	16.00	9.50	11.50	7.00	9.80	5.00	20.00	4.00	3.00	1.00
Iloos Norte	4.00	2.50					4.00	4.00	16.80	5.00	4.00	1.00
Iloos Sur	4.50	2.75			10.00	6.00	7.00	4.50	30.00	4.50	4.00	1.00
Iloilo	4.00	2.50	14.00	12.00	11.40	6.00	9.50	7.00	22.00	5.00	3.00	1.50
Isabela	4.00	3.75							30.00	7.50	5.00	2.50
La Laguna	3.50	2.50	12.00	6.00	8.50	6.00	10.00	8.50			3.00	1.00
La Union	3.75	2.25			8.00	6.00	6.60	4.00	9.00	7.00	4.50	2.00
Leyte	4.50	1.50	14.00	6.30	10.00	6.50	9.71	5.50	30.00	4.60	4.50	2.50
Mindoro	4.00	2.50	15.00	9.00							3.00	2.50
Misamis	3.00	2.50	9.50	3.16			10.50	8.00	12.00	6.00	3.00	2.50
Moro	3.00	2.50	15.00	5.69	9.50	8.85	10.50	8.00			3.00	2.50
Mountain	6.00	2.50			6.00	5.00			27.00	21.00	3.00	1.00
Nueva Ecija	2.77	1.50					8.25	4.00	12.00	2.50	4.00	1.00
Nueva Vizcaya	3.00	2.50			10.00	8.00	11.00	5.25	23.00	7.50	3.75	1.50
Occidental Negros	3.25	2.00	16.50	8.00	11.00	6.50	9.50	6.00	30.00	6.00	3.75	1.50
Oriental Negros	3.00	2.00	15.12	6.00	12.00	6.00	10.00	7.50	23.00	5.00	5.00	2.50
Palawan	3.00	2.60			7.00	7.00						
Pangasinan	3.00	2.50			9.50	5.25	8.00	5.00			3.00	2.00
Pampanga	3.75	2.50					10.00	4.00	20.00	4.00	3.80	1.50
Rizal	3.00	2.50					8.00	6.00			5.80	1.00
Samar	3.75	1.75	15.00	9.00			7.60	7.00	30.00	6.00	3.50	1.50
Sorsogon	3.75	2.00	12.00	5.06	8.85	5.50						
Surigao	4.00	2.20	12.00	8.50	10.00	8.00						
Tarlac	4.00	1.75					10.00	5.00	23.00	5.82	2.50	1.50
Tagaybas	3.25	1.50	15.00	4.50	8.80	6.00	10.00	7.50	12.00	3.00	5.00	1.40
Zambales	3.12	2.00			10.00	7.00	10.00	4.00	18.00	7.00	4.00	2.50

TEMPERATURE AND RAINFALL FOR AGRICULTURAL DISTRICTS IN THE PHILIPPINES.

By the DIRECTOR OF THE WEATHER BUREAU.

NOVEMBER, 1910.

[Temperature and total rainfall for twenty-four hours beginning at 6 a. m. each day.]

Date.	Hemp.				Sugar, Iloilo.		Rice, Tarlac.		Tobacco.			
	Albay.		Tacloban.		Temperature.	Rainfall.	Temperature.	Rainfall.	Aparri.		San Fernando.	
	Temperature.	Rainfall.	Temperature.	Rainfall.					Temperature.	Rainfall.	Temperature.	Rainfall.
	°C.	mm.	°C.	mm.	°C.	mm.	°C.	mm.	°C.	mm.	°C.	mm.
1	24.2	279.4	24.2	132.1	24.9	128.6	28.2	1.3	26.8	7.6	27.8	---
2	26.5	6.1	27	---	25.3	1	26.8	19	26.6	3.8	28	---
3	27.6	---	27.4	---	27.2	---	27.8	---	24.8	8.4	27.7	.5
4	27.4	2.8	26.7	---	27.3	5.3	26.2	2	24.9	2.8	27.4	7.6
5	26.4	3.9	26.9	3	26.4	.8	27.6	---	25.5	2.3	27.2	---
6	27.4	7.6	25.8	24.9	25.8	16.2	27.4	---	24.9	2.6	26.6	---
7	27.3	4.6	25.5	4.1	27.1	---	27.8	---	25.6	---	27	---
8	26.4	9.7	26.2	---	27.8	---	28.1	1.8	26.3	6.8	27	---
9	26.7	---	26.4	31.2	26.4	4.3	28.8	1.3	27.1	---	27.3	---
10	25.1	.3	24.6	34.1	26	---	29	---	25.3	88.6	27	---
11	25.4	---	25.2	3	26.1	32.5	28.4	---	24	12.7	26.7	---
12	25.7	14	26.3	---	26.3	---	27.6	---	23.4	33.1	26.8	---
13	24.6	25.4	25.8	.8	25.8	2.1	26.4	6.4	24.1	5.7	26	---
14	26.6	.8	26.2	2	27	---	25	7.9	24.6	21.1	25.2	---
15	27.4	---	27.8	---	26.9	---	28.3	---	25.1	.8	27.7	---
16	26.5	5.4	25.6	7	26.5	3.6	28	2	25.7	50.6	27.1	22.6
17	27.7	---	26.4	---	26.1	---	27.4	6.4	23.2	287.7	23.8	---
18	26.4	19.5	26.1	2	26.1	100.3	27.8	---	22.8	13.4	26.2	---
19	25.6	10.4	24.6	13.7	25.1	9.9	27.8	---	23	12.7	27.1	---
20	26.8	16.3	25.5	28.9	25.7	4.3	26.6	1.3	24.4	5.1	26.3	3.8
21	25.8	27.9	26.2	9.4	26	13.7	27.3	8.9	25.5	---	26.6	1
22	25.4	4	26.9	.8	26.5	3.5	23.2	19	25	34	24.1	---
23	27.4	9.1	27.8	---	26.5	31.2	26.8	3.8	24.8	3.8	26.3	---
24	26.9	22.4	26.1	17.8	25.9	27	28.3	---	25.2	1.8	26.8	---
25	26.4	4.1	26.8	.5	25.7	6.9	27.2	---	25.5	---	27	---
26	25.6	5.8	26.7	14.3	26.7	9.4	25.4	---	25.3	---	26.2	---
27	27	7.6	25	24.6	25.1	38.9	26.7	---	25.4	---	25.6	---
28	26.2	5.6	24.8	5.5	24.7	19	27.2	---	25.2	---	25	---
29	26.5	2.5	26.3	.5	24.4	1.5	26.6	---	25.3	---	25	---
30	25.5	41.6	26.8	3.3	26	.5	27.6	---	25.3	2	24.8	---



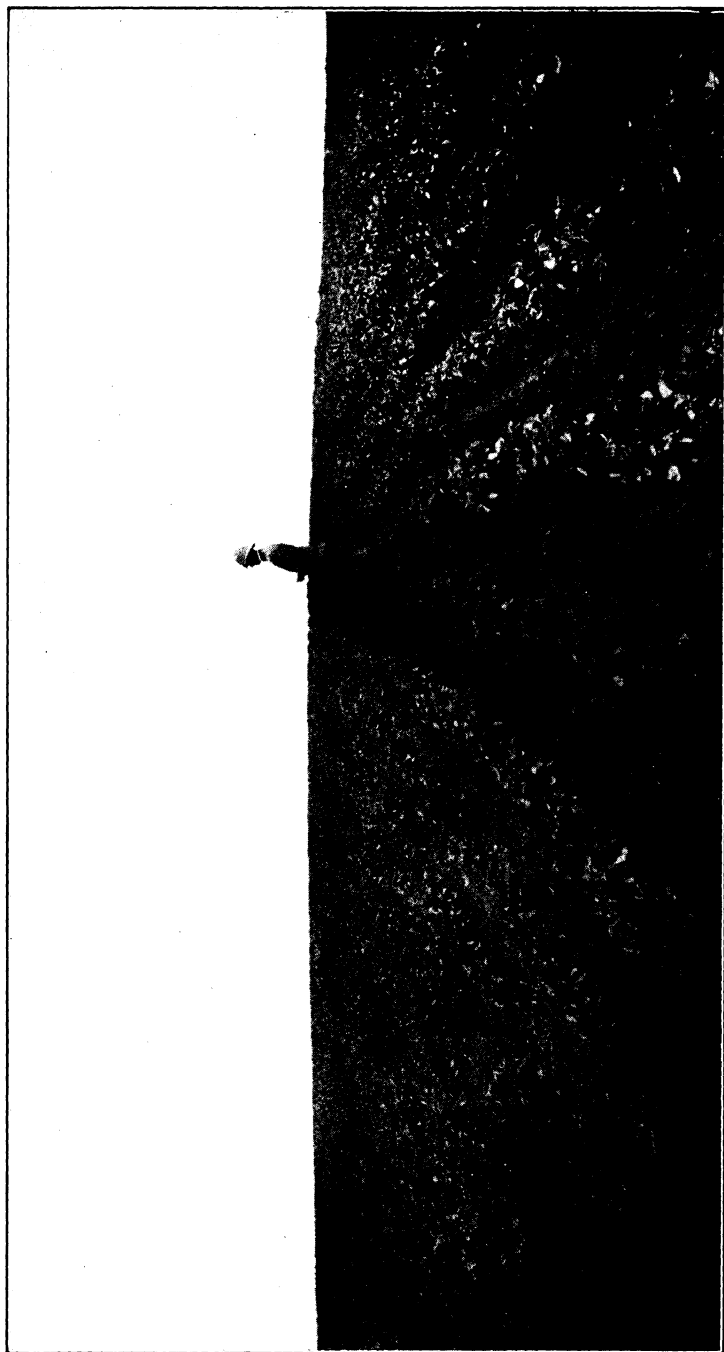


PLATE I.—THE CAMP VICARS POTATO FARM.

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EDITORIAL.

GET THE CARNIVAL SPIRIT.

The fourth Philippine Carnival will be held from February 21 to 28 in the city of Manila. With the valuable experience that has been gained during previous Carnivals, and the spirit of hearty coöperation that prevails among all parties connected with this work, there is every reason to believe that the Carnival of 1911 will be an even greater success than those of the past three years.

Frequent mention has been made in the pages of the REVIEW of the increasing prominence that has been given each year to the industrial features of the Carnival. Last year the industrial side of the Carnival included, not only the usual Insular and provincial exhibits of the products of the Islands, but also a live-stock show, machinery demonstrations, illustrated lectures, and a series of agricultural conferences. These features will be repeated this year.

The agricultural conferences held last year were eminently successful. Arrangements have been perfected to hold a second series of conferences this year on February 21, 22, 23, and 24. At these conferences questions of vital interest to the farmers of the Islands will be discussed. All of the provinces have been invited to send delegates to the conferences and it is hoped that there will be a large attendance.

No effort has been spared on the part of the board of directors to make the Carnival of 1911 a success. It now remains for the people, not only of Manila but of the entire Archipelago, to give their hearty support to this work. Come to the Carnival yourself, bring your friends, and if you haven't it already, *Get the Carnival Spirit*.

THE USE OF FERTILIZERS IN THE PHILIPPINES.

There appears to be a prevailing idea that the agricultural lands of the Philippine Islands are wonderfully fertile, and that any general use of fertilizers in this country is neither necessary nor desirable. As a matter of fact, however, this idea does not represent the conditions that actually exist. It is quite true that there are enormous areas of land in the Islands where the virgin soil contains an abundant supply of plant food that has been stored up by nature for the production of future crops, but these vast, undeveloped areas do not represent what is ordinarily considered as our *agricultural land*. That part of the country which may properly be considered at the present time as the agricultural land is the land that has been brought under cultivation and which, in a large part at least, is now under cultivation. Such land in the Philippines, instead of being uniformly fertile is, ordinarily, very deficient in the supply of available plant food which it contains. This condition is to be expected when it is considered that crops have been taken off the land year after year, in many places for generations, with no return of plant food having been made.

The gradually increasing use of fertilizers in any locality usually indicates a corresponding improvement in agricultural

conditions in that locality. The use of fertilizers is an essential part of *intensive* farming. Instead of growing small crops on large areas the farmer learns to grow large crops on small areas, thereby economizing in labor, transportation, and in many other ways. Furthermore, the increasing use of fertilizers marks, not only a general improvement in the agricultural conditions, but also an improvement in the farmers themselves, for the intelligent use of fertilizers is one of the most complicated and difficult branches of agricultural work. The feeding of plants involves a knowledge of the plant and its requirements, of the soil and what it contains, and of the materials that are supplied as plant food in the form of fertilizers.

Owing to existing conditions the use of fertilizers, and especially of commercial fertilizers, in the Philippine Islands will probably develop slowly. The great majority of the farmers in this country have very limited capital, and such capital as they have is largely required for the purchase of draft animals to replace those that have been destroyed. With the elimination of rinderpest as a factor in Philippine agriculture, and the consequent restocking of the farms, there will undoubtedly be a large increase in the use of fertilizers.

In the present number of the REVIEW the subject of "Fertilizers" is discussed in detail by the Assistant Director of Agriculture. Three general classes of fertilizers are considered, viz, farm manures, green manures (leguminous crops), and commercial fertilizers. Each of these classes has its own particular place in the Philippine agriculture of to-day. There is no reason why the farmers throughout the Islands should not save and utilize, at practically no expense, such fertilizing materials as are produced on their farms. A much more general use of green manures than is practiced at the present time is also entirely practicable. The use of commercial fertilizers must necessarily be restricted for the present to those farmers who have, or can obtain, the capital required for the purchase of such fertilizers. The development of the sugar and tobacco industries, and the gradually suppression of rinderpest, thereby making more capital available, should result in a steady increase in the use of commercial fertilizers in this country, and a consequent improvement in our agriculture.

THE RINDERPEST CAMPAIGN.

Under the title "Field Operations Against Rinderpest in the Provinces of Bulacan and Pampanga" the chief veterinarian discusses in this number of the REVIEW a plan of campaign against

rinderpest that is now being given a thorough trial in the provinces directly north of Manila. For a number of years the fight against rinderpest has been carried on against overwhelming odds. With infection existing practically throughout the Islands, and with new outbreaks constantly occurring in widely separated localities, the small force of men available for fighting this disease has been able to do hardly more than hold it in check. The thorough "cleaning up" of any one province, which can only be done with a large force of men, has been in most cases impracticable.

The increase in the size of the veterinary force, together with the valuable assistance now given in this work by the Bureau of Constabulary, have made it possible to put into effect within limited areas the plan of campaign outlined in Doctor Ward's article. The results thus far attained by these means are most encouraging.

FERTILIZERS.

By C. M. CONNER, *Assistant Director of Agriculture.*

With the increasing interest in agriculture in these Islands the all-important question is how to increase the production of our fields at a minimum cost. Up to the present time little or no attention has been paid to the use of commercial fertilizers for increasing the yield. Commercial fertilizers may be regarded as an artificial stimulant in crop production just as the feeding of grain may be so regarded in the production of beef and pork. This paper has been prepared in order to answer many of the inquiries coming in relative to the use of commercial fertilizers.

Plants require food in order to grow and develop just the same as animals, except that the food which plants use is in a different form and is derived from the soil and air.

Plants will be small and give little or no fruit, or will be large and give a heavy yield of fruit, according to whether or not they can get plenty of plant food and sunshine. If the soil is rich and the plants are crowded, either by other plants of the same kind or by plants of a different kind, so that they do not get plenty of sunshine and air, they will be small and stunted. An improved variety of plants is the result of furnishing the plant with plenty of food and protecting it from other plants by keeping the ground clean and cultivated, just as an improved breed of animals is the result of good treatment. Improved plants or animals if neglected by man revert to their original type, or if they have been under domestication for a long period of time will probably disappear altogether, if not cared for by man. In order to grow the best plants it is not sufficient to protect them from other plants, but it is necessary to supply plant food of the proper kinds and in the proportions required by the plant. Some soils possess all the elements of plant food in sufficient quantities to develop the plant to its highest limit. Fertilizers will have no effect on such soils. However, there is a limit to the development of any plant; if there were tons of available plant food in the soil, a plant growing upon it can not

develop beyond its capacity any more than an animal having an unlimited supply of food would develop very far beyond the normal for that kind of animal. Most plants growing as nature places them do not develop to their limit for the reason that they are retarded by the presence of other plants or by the absence of plant food.

The elements which plants derive from the soil and which concern the farmer most are nitrogen, phosphoric acid, potash, and lime. There are other elements used by the plant, but, as a rule, they are found in most agricultural soils in sufficient quantities to supply the wants of the plants. The phosphoric acid, potash, and lime found in the soil came originally from the rocks. When rocks are exposed to the air they crumble and decay, the rains wash the fine particles down to lower levels and form what is known as soil. This decay or rotting of the rocks goes on continuously and the elements of plant food are liberated in this way and become available to plants. As soon as a sufficient quantity of soil is formed for plants to take root, small plants start growing on the soil and aid in the decomposition of the small particles by the secretion of certain acids by their roots. The mature plants fall upon the ground and add to the fertility of the soil already formed, if they are not destroyed by fire.

When the dead leaves and stems become incorporated into the soil they form humus. This term humus applies to any partially decomposed organic matter. The cells of the plant being partially decomposed act as a sponge in holding water, hence a soil rich in humus has a large water-holding capacity. Plants growing upon such soils during a period of drought are able to grow on account of the presence of this water in the humus, whereas they would probably die were there not humus in the soil. When this humus becomes thoroughly decomposed it adds to the fertility of the soil in that the elements stored up in the plants while growing become available for other plants as soon as decomposition takes place.

Soils will be rich in phosphoric acid, potash, or lime according to the composition of the rock from which they were formed. For example, if the soil is formed from limestone rock there will be an abundance of lime in the soil; if formed from rocks free from lime of course there will be no lime in the soil, and the soil is likely to be sour or acid; a soil formed from a rock rich in potash will naturally be rich in this element. Most clay soils are rich in potash, whereas sandy soils are usually deficient in potash. The nitrogen that is in the soil came originally from

the air. Nitrogen gets into the soil in several ways. The principal way is by the agency of leguminous plants, such as beans, peas, clover, etc. These plants have the power of collecting free nitrogen from the air by means of certain bacteria which live in the tubercles or nodules on the roots of the plant. This nitrogen is used by these plants in building up their tissues, but when these plants die the nitrogen that has been collected by the agency of these bacteria and stored in the stems, roots, and leaves of the plants becomes available to other plants growing upon the soil as soon as decomposition sets in. Nitrogen gets into the soil also by being washed down from the air by rains after it has been formed into a nitrate by the electricity in the air, such as lightning. Soils containing large quantities of organic matter are usually rich in nitrogen. However, plants can not make use of this nitrogen locked up in the organic matter until it has decayed. As mentioned above, decay is hastened by exposing the soil to the air, hence frequent plowing will make the elements of plant food available more rapidly than if the soil were allowed to lie undisturbed. The fertility, or the ability, of the soils to produce large crops, can not well be determined by chemical analysis. Chemical analysis, however, will determine whether or not elements such as nitrogen, potash, phosphoric acid, or lime are deficient or totally lacking in the soil. Walker in his "Sugar Industry in the Island of Negros" makes this point very clear and is quoted here:

Now, in 1 hectare of land, from the surface to a depth of 20 centimeters, or the average depth to which the cane roots penetrate, there are 2,000 cubic meters of soil of an approximate apparent specific gravity of 1.5, or 3,000,000 kilos. One-hundredth of 1 per cent of this, the smallest difference which can be detected by an accurate chemical analysis, would amount to 300 kilograms of any one element, so it may be readily seen that at least five, and more probably ten, years would be required before any depletion of the soil from successive crops of sugar cane would be suggested by chemical analyses, even if absolute accuracy in sampling and in analytic methods were assumed, not to mention the greater changes which might be brought about during such a long period of time by mineral matter carried up from greater depths by the soil water, or carried away by rains.

These figures make no pretense at even moderate accuracy, but serve to illustrate the relatively small order of magnitude of changes in the composition of a soil which may be brought about by the cultivation of sugar cane. It is likewise apparent that the ordinary commercial fertilizers would need to be used in quantities of many tons to the hectare before any improvement in the soil as regards its actual composition could be detected. This should not be construed as an argument against

the use of fertilizers, for they are undoubtedly at times of great benefit, even in very fertile soils, but the way in which they act and indications for their use, although the matter has been carefully studied for many years in all parts of the world, are very little understood.

Cameron states the most modern views on this subject as follows:

Soil chemistry is a very complex subject, into which we are just beginning to get glimpses, and the supply of mineral nutrients is only one of the important details in a very intricate problem. * * * It is of course patent to everyone that fertilizers sometimes, in fact frequently, produce larger crop yields. Sometimes the contrary is true, but it is absolutely certain that at the present time no one can, nor are there any methods available by which one can, safely predict what fertilizers and how much should be used.

Plants require their food in certain proportions. A soil may be rich in *one* of the elements and still be called a poor soil. For example, a soil may be deficient in nitrogen and the crops growing upon it would be poor, whereas there might be a sufficient amount of available phosphoric acid and potash to grow a crop twice the normal size, provided that the nitrogen was supplied. This same statement may be applied to the other elements of fertility in the same way. There is no way of determining whether or not a soil is deficient in these various elements without making a field test. In order to do this, select a uniform piece of ground and lay out eight one-tenth hectare plats, preferably twice as long as wide, prepare the ground thoroughly and apply chemical fertilizers as follows:

Plat.	Kilos.	Fertilizer.
No. 1 -----	20	Nitrate of soda.
No. 2 -----	20	Nitrate of soda.
	12	Sulphate of potash.
No. 3 -----	12	Sulphate of potash.
	10	45 per cent acid phosphate.
No. 4 -----	20	Nitrate of soda.
	10	45 per cent acid phosphate.
No. 5 -----	12	Sulphate of potash.
	10	45 per cent acid phosphate.
No. 6 -----	20	Nitrate of soda.
	10	45 per cent acid phosphate.
No. 7 -----		No fertilizer.
No. 8 -----	12	Sulphate of potash.

This is on the basis of 600 kilos of a fertilizer containing 5 per cent nitrogen, 8 per cent phosphoric acid and 10 per cent potash.

Plant these plats with the same kind of seed and in the same manner, harvest and weigh the crop. The weight of the crop

will show the effect or noneffect of the fertilizer. This same experiment can be tried again by varying the rate of fertilizer used per hectare. Great care should be taken in applying the fertilizer and in weighing the crop or the result may be misleading. Corn, rice, or sugar may be planted on the plots.

Each element of plant food mentioned above serves a different purpose in the building up of the plant. For example, nitrogen is used in developing the leaf and stem of the plant. It should not be understood, however, that plants producing only leaves and stems need only nitrogen, but that nitrogen is more important to such plants than are the other elements of fertility, hence grass which is not grown for seed requires a larger quantity of nitrogen as compared with the other elements of fertility. Plants producing starch or sugar use large quantities of potash in the forming of this starch or sugar, hence such plants as sugar cane, manihot, potatoes, rice, etc., require liberal quantities of potash for their best development. Plants producing seed, such as wheat, corn, rice, etc., require large quantities of phosphoric acid. Lime is used by all plants more or less in building up the stem and body, or the woody portion of the plant.

Fertilizers, as generally purchased on the market, are prepared for certain classes of crops and in many cases for one particular crop, such as zacate, vegetables, sugar cane, fruit trees, etc. There are very few, if any, natural fertilizers that can be applied to growing crops with profit without the addition of certain other elements, in order to make a balanced ration for the plant, unless the soil should be rich in some one or more of the elements. Many of the materials used in making these mixtures are what may be called standard; by this we mean that they do not vary to any great extent in their composition and are frequently referred to by name in speaking of the composition of fertilizers. In order that the reader may be more or less familiar with some of these materials the following list is given, together with such explanation as may be needed in order that one may clearly understand the nature and composition of the material:

SOURCES OF SOME OF THE RAW MATERIALS USED IN THE MANUFACTURE OF ARTIFICIAL FERTILIZERS.

NITROGEN.

Nitrate of soda.—This comes principally from the mines of Chile and is frequently known as Chile saltpeter. The raw nitrate of soda is mined, dissolved in water, and recrystallized.

It is fairly constant in its composition and usually contains about 16 per cent of nitrogen, but owing to the fact that it takes up some water in a moist climate only 15 per cent should be counted upon here. Nitrate of soda when dissolved in water is immediately available as plant food, hence it is known as a quick fertilizer. For this reason it is used as a supplement to other fertilizers; that is, whenever it is found that plants are suffering for the want of nitrogen a small quantity of nitrate of soda applied along the side of the rows will correct the deficiency at once. The effect of nitrate of soda can be noticed in forty-eight hours after it has been applied, in some cases. Plants suffering for want of nitrogen are light green color and when nitrogen is abundant they take a dark green appearance. As it is very soluble in water, it should not be applied during the rainy season, nor where there is an excessive amount of water, as it will become so diluted that the plants can not obtain the required amount. In handling nitrate of soda it should not be left exposed to the weather, as it takes up water rapidly and a large percentage will be lost.

Dried blood.—It contains from 10 to 12 per cent of nitrogen, but its composition is not constant and a guaranty of analysis should be called for before buying. It is a quick acting fertilizer and very effective.

Sulphate of ammonia.—This is a by-product obtained from the manufacture of coke. It contains about 20 per cent of nitrogen and when applied to the soil becomes quickly available as plant food. It should never be mixed with lime or basic slag, but should be applied separately or mixed with some other material that will not form an insoluble compound.

PHOSPHORIC ACID.

Acid phosphate.—The bulk of the phosphoric acid used is derived from phosphate rock. At present this rock is found principally in Florida, South Carolina, and Tennessee. The rock as mined is insoluble and, as a rule, is of little value as a fertilizer until reduced to a fine powder and treated with sulphuric acid. This treatment renders the phosphoric acid available to plants, and also forms considerable sulphate of lime or land plaster. Acid phosphates from ordinary rock contain from 12 to 18 per cent available phosphoric acid. Acid phosphates containing higher percentages of phosphoric acid are usually obtained by washing the soluble phosphoric acid out of the low-grade phosphate fertilizer and reinforcing the higher grades;

these are known as superphosphates. Superphosphates of this character may sometimes contain as high as 45 per cent of available phosphoric acid.

Bones.—Raw or steamed bones and bone charcoal are frequently used as a source of phosphoric acid. Raw bones contain from 3.5 to 5 per cent nitrogen and 20 to 25 per cent phosphoric acid. The composition of the bones varies according to the age of the animal. Practically all the phosphoric acid in bones is available as fast as the bones decay, hence bones to be of value as a fertilizer should be ground fine in order to hasten the decay. Steamed bones are preferable to unsteamed bones, as the steaming removes the grease, etc., which interferes with the decomposition of the bones to a slight extent. In order to make bone meal become available quickly it should be mixed with more or less lime.

Basic slag.—This is a by-product in the manufacture of Bessemer steel. The phosphoric acid content of basic slag ranges from 15 to 20 per cent. The phosphoric acid in basic slag is in what is known as the insoluble form, but when placed in the soil the phosphoric acid becomes available to plants. In using this material it should not be mixed with acid phosphate or sulphate of ammonia. Basic slag usually gives best results when used on sour soils.

POTASH.

Potash salts.—Practically all the potash now used in commercial fertilizer comes from the potash salt mines in Germany known as the Stassfurt mines. These potash salts are found in connection with deposits of rock salt. The forms of potash salts known to commerce are kainit, muriate, and sulphate of potash; there are other forms, but not in general use. Kainit is the raw product as mined and contains about 12.5 per cent of soluble potash and a varying quantity of common salt. Muriate and sulphate of potash are refined from the low grade salts as mined. Commercial muriate and sulphate each contain about 50 per cent soluble potash. It should be borne in mind that kainit and muriate of potash should not be used for fertilizing tobacco, as the chlorine injures the burning quality of the tobacco. As a rule muriate of potash is cheaper than sulphate, owing to the fact that sulphate of potash is used in manufacturing. In the Philippine Islands it is not advisable to buy anything except the muriate or sulphate, as will be explained later under the head of concentrated fertilizers.

OTHER MATERIALS.

Fish and fish scrap.—Fish have been used as a fertilizer for a long time. In many cases they prove quite beneficial to the soil where they can be obtained in large quantities. Their use should be supplemented by the addition of potash and such phosphoric acid as is necessary in order to make their use profitable. Dried fish scrap usually contains from 9 to 10 per cent nitrogen and 6 to 8 per cent phosphoric acid.

Natural guanos.—In many parts of the Philippine Islands large deposits of bat guano may be found which contain sufficient nitrogen, phosphoric acid, and potash to make it profitable to mine it, but the composition of these deposits of guano is so variable that a chemical analysis and actual test upon growing crops should be made before attempting to use them extensively.

Tankage.—This is the refuse from the slaughterhouse and usually contains scraps of meat, blood, bones, and other waste parts of the slaughtered animal.

The different brands vary more or less in composition, being usually deficient in potash. The chemical composition, however, should be known before purchasing any particular brand and its value determined according to the number of pounds of nitrogen, phosphoric acid, and potash it contains. Other things being equal it is better to use tankage than any other fertilizer, as the tankage decomposes slowly and the fertilizing elements are not leached out by heavy rains. It also has the property of improving the mechanical condition of the soil.

There is a tankage manufactured in Manila from dead animals which contains about 4 per cent nitrogen, 8 per cent soluble phosphoric acid, and 14 per cent insoluble phosphoric acid. There are other brands of tankage manufactured in Australia and the United States which vary in composition according to brand.

Farm manures.—Too much stress can not be laid upon the use of stable manure. While it is true that the composition of stable manure depends largely upon the ration fed to the animal, yet the addition of any stable manure to the soil will improve it, not only from the standpoint of the addition of the elements of fertility, but the improvement to the mechanical condition which will enable the plants to grow better even were there no fertility added. This fact is recognized in many of the old countries where land is scarce and the production of the crop must be increased. In many parts of India large herds of cattle are kept for the sole purpose of supplying manure to the fields.

Very few analyses have been made of farm manures in these Islands, but in order to give the reader an idea of their composition the following table is attached:

Average composition of the most important farm manures.

	Nitro- gen.	Potash (K ₂ O).	Phosphoric acid (P ₂ O ₅).	
			Total.	Lime (CaO).
Cow manure (fresh) -----	0.34	0.40	0.16	0.31
Horse manure (fresh) -----	0.58	0.53	0.28	0.21
Sheep manure (fresh) -----	0.83	0.67	0.23	0.83
Hog manure (fresh) -----	0.45	0.60	0.19	0.08
Hen dung (fresh) -----	1.63	0.85	1.54	0.24
Mixed stable manure -----	0.50	0.63	0.26	0.70

Use of leguminous crops.—Leguminous crops, such as velvet beans, mongos, and sitao planted upon the land, either occupying the entire area or planted between the rows of the growing crop, add nitrogen to the soil. As stated before, this nitrogen is collected by the plant through the agency of certain bacteria which live in nodules on the roots. It has been found that a crop of velvet beans weighing 9,605 kilos per hectare if plowed under and mixed thoroughly with the soil, will return to the soil 64.2 kilos of nitrogen; this is enough nitrogen to last any ordinary crop three years. The nitrogen contained in these vines, leaves, and stems is not immediately available to the growing crop, but as the vegetable matter rots, the nitrogen gradually becomes available and even in this climate where decomposition goes on rapidly the effect would extend over at least two growing seasons. By referring back to the cost of commercial fertilizer per ton it will be noticed that this 64.2 kilos of nitrogen has a commercial value of ₱57.78. In many of the cane fields of Louisiana, cowpeas which collect practically as much nitrogen per acre as velvet beans, are planted after every crop of cane in order to furnish nitrogen for the next crop of cane which is to be planted upon the land. In this way the cost of fertilizer is reduced and the yield of cane materially increased. There is no reason why a similar procedure could not be followed in these Islands.

Market value.—The market value of a fertilizer is determined by multiplying the number of kilos of nitrogen, phosphoric acid, and potash in one ton of the fertilizer by the price of these elements per kilo. The price of these elements is determined by taking such standard fertilizers as acid phosphate, nitrate of soda, and sulphate of potash and determining the cost per

kilo by dividing the price paid for these materials upon the local market by the number of kilos of the fertilizing elements in them. According to the present market price of these materials, nitrogen is worth 90 centavos per kilo, phosphoric acid is worth 25 centavos per kilo, and potash is worth 28 centavos per kilo. From these figures the value of any mixed fertilizer or any fertilizing materials may be determined. For example, a ton of fertilizer containing 5 per cent nitrogen, 8 per cent phosphoric acid and 10 per cent potash may be calculated as follows:

50 kilos nitrogen, at ₱0.90 per kilo, equals	₱45.00
80 kilos phosphoric acid, at ₱0.25 per kilo, equals	20.00
100 kilos potash, at ₱0.28 per kilo, equals	28.00
Bagging and mixing	7.00
Total	100.00

The use of concentrated materials.—Since a ton of fertilizer is valued according to the number of kilos of available nitrogen, phosphoric acid, and potash, the higher the percentage of each, the cheaper the transportation; take as an example kainit, which contains only one-fourth as much soluble potash per ton as does a ton of sulphate of potash. It costs ₱60 to transport 500 kilos of soluble potash in the form of kainit from Germany to the Philippine Islands, but if purchased in the form of sulphate of potash the cost would be only ₱15. The same would hold true in transporting 500 kilos of soluble potash from the bodega to the field. It would take just four times as many trips to transfer the 500 kilos of soluble potash in the form of kainit as it would in the form of sulphate of potash.

Filler.—When a ready-mixed fertilizer is sold under guaranty to contain a certain percentage of nitrogen, phosphoric acid, and potash, a certain amount of dead material known as filler has to be used to make it weigh one ton. Take, for example, a fertilizer containing 4 per cent nitrogen, 7 per cent phosphoric acid, and 8 per cent potash. In mixing this fertilizer nitrate of soda, 18 per cent acid phosphate, and sulphate of potash can be used. The amounts of the various materials required are as follows: A ton of fertilizer containing 4 per cent of nitrogen would contain 40 kilos of nitrogen. If nitrate of soda contains 15 per cent of nitrogen, it would take as many hundred kilos as 15 is contained times into 40, or 266 kilos of nitrate of soda. Likewise it would require 389 kilos of acid phosphate and 160 kilos of sulphate of potash. The total amount of materials required then is 815 kilos. In order to make 1,000 kilos, or one ton, it is necessary to add 185 kilos of dead material, such as dirt, sand,

etc., to bring it up to the 1,000 kilos. When the purchaser of fertilizers so mixed pays the freight on the dead material and pays for the handling of it from the bodega to his fields, he gets no return whatever for this outlay.

The source of the different elements required by plants mentioned above is of no importance to the plant itself. It is immaterial whether the nitrogen comes from nitrate of soda, sulphate of ammonia, dried blood, or any other source; or whether the phosphoric acid comes from acid phosphate, Thomas slag, bones, or fish; or whether the potash comes from kainit, muriate of potash, sulphate of potash, or wood ashes, so long as the material which carries the nitrogen, phosphoric acid, or potash does not also carry some element the presence of which may prove detrimental to the growing plant, the quality and flavor of the fruit, and in the case of tobacco, the burning quality.

The original plant food in the soil at the time that it is first placed under cultivation should be regarded by the farmer as a bank account, and he should not continuously draw upon it without returning something to the soil any more than he would expect his bank account to last indefinitely without adding to it from time to time.

There are many ways in which the farmer can conserve the fertility of his soil without necessarily purchasing artificial fertilizers. There are thousands of tons of nitrogen driven off into the air every year by burning the grass, weeds, leaves, etc., on the fields. If these could be returned to the soil, or if they could be piled in some convenient place and allowed to rot and then applied to the soil, the production of the fields could be increased in this way without any outlay. One can also increase the production of his fields by growing, whenever possible, leguminous crops, such as peas, beans, etc.

Home mixing.—The farmer may purchase the raw materials and make his own mixture, if he so desires, or he may purchase them already mixed in accordance with the requirements of his crops. The mixing of a fertilizer is not a difficult matter if all of the materials are fresh, but in this climate it frequently happens that acid phosphate, muriate of potash, and nitrate of soda will take up moisture from the air and when they dry again hard lumps may be found, which must be broken up or ground in order to make a perfect mixture. The ingredients may be weighed out according to formula, spread in layers upon clean hard ground, or better, upon a concrete floor, and shoveled over two or three times until the mixture is of uniform color. It should then be sacked and may be set aside until ready

for use. If large quantities of fertilizer are used, say as much as 50 tons, it would be well to order the fertilizer ready mixed, as mixing can be done more thoroughly on a large scale and about as cheaply as the farmer himself can do it.

Application.—A fertilizer should be applied to the soil in such a manner that the roots of the plant will come in contact with it as soon as the plant starts to grow and be able to use up practically all of the fertilizer that has been applied during the growth of the plant. In some cases where crops are forced this is not advisable, as the gains obtained in forcing the crop more than pay for the excess of fertilizer applied. Where crops are planted in rows it is better to apply the fertilizer immediately under the row before planting, or at the side soon after planting. It is much less expensive to apply the fertilizer before planting. Fertilizer may be applied with a drill drawn by cattle, or carabaos. Drills may be purchased which will distribute the fertilizer in one or two rows at one time. In case the drill is not available, the fertilizer can be distributed very evenly by hand. If the workmen are not familiar with the distribution of fertilizer, it is well to measure the rows, preferably in lengths of 100 meters, weigh out the amount of fertilizer that should be applied on a row 100 meters long, place this in a sack or bucket and let them distribute, being sure to spread it evenly in the row. After one-half day's practice of this kind they will distribute the fertilizer without either weighing, or measuring the distance, and put it on very uniformly. After the fertilizer has been placed on the ground it should be worked in with a plow or harrow of some description, so that it will spread uniformly through the immediate root-feeding area of the row. In case the crop is to be sown broadcast over the surface, then, of course, the fertilizer may be applied broadcast and harrowed in. In most cases it is immaterial whether the fertilizer is applied one or ten days before planting. Such fertilizers as cotton-seed meal or other organic substances used as a fertilizer, which are likely to ferment when they become moist, should be applied some days before planting, because if the seeds come in contact with this fermenting substance, they will rot. In the case of inorganic fertilizers there is no danger of the seed being injured, unless large quantities are used.

THE CAMP VICARS POTATO FARM.

By O. W. BARRETT, *Superintendent of Experiment Stations.*

For the past two years the subject of raising potatoes in the Philippines has attracted the attention of many people outside, as well as inside, the official circles, but thus far the public is still guessing, more or less, as to the degree of economy in the results obtainable under average conditions.

In the first place it is rather unfortunate that people from the temperate climates are accustomed to rely upon the potato as a necessary article for the table; here in the Tropics where various yams, cassavas, taros, and other root tubers are more nutritious and more cheaply grown than the potato, notwithstanding the advantage of using these tropical productions, the average American or European housewife prefers to pay three or four times as much for the imported tuber, even if it is watery, shriveled, or badly sprouted. The American soldier is no exception to the rule, for he insists upon the "Irish" potato at any cost as a part of his rations; and the sweet potato is rejected except as an emergency article of diet.

Japan has profited largely by these predilections and dietary habits, for the greater part (about 85 per cent) of the potatoes imported into the Philippines are grown in that country.

Not until the subsistence department established a wholesale production farm at Camp Vicars, Mindanao, had the experiment of growing potatoes on a large scale been attempted in the Philippines, though numerous successes in a small way had been reported.

This farm, now becoming famous throughout the East, has the largest potato field in the Orient. It is located on the south shore of Lake Lanao, at an elevation of about 1,000 meters. This altitude reduces the temperature to something comparable with that of the growing season of Maine, the famous potato State of the Union. The climate, aside from the temperature, is good although for potato culture it might be better if the rains were not quite so regular. This latter statement may seem paradoxical, but it must be remembered that in these days a field ab-

solutely free from blight and fungus diseases is probably unknown anywhere in the world (with the possible exception of Chile) and a too humid atmosphere with no "dry spells" may conduce to the spread of these pests. The soil of this farm is as near perfection as possible from the standpoint of its physical character; its principal fault, however, is the lack of nitrogen; this is explained by the fact that for many years previous the land had been in cogon sod, and this grass was regularly burned off by the Moros once or twice each year. This burning left no humus in the soil except that made by the dying roots; the mineral salts (ashes) were, for the most part, taken back into the soil, however, instead of being carried away by rains. The first problem then, at Camp Vicars farm, was what the soil required in the line of artificial manures to produce a good crop of potatoes; of the two methods of enriching the soil green manuring was obviously too slow to meet the requirements of the subsistence department and, therefore, the direct application of nitrogenous fertilizers was adopted as the quickest (though by far the most expensive) method. The soil itself being entirely of a volcanic character, was probably formed from the old lavas of the gigantic group of craters which probably occupied, ages ago, the present site of Lake Lanao. It is neither clay nor sand, but a happy-medium mixture of fine and coarse silt-like material made by the gradual breaking down or "decay" of the aforesaid grayish lavas. The subsoil is practically identical with the surface soil except that the slight amount of humus contained in the latter is absent in the former. In short, the soil is suited for withstanding droughts and yet sufficiently sandy to prevent stagnation of water in the soil; that is, it does not "wash" in wet weather and crack in dry like clay, neither does it immediately dry out like a sandy soil.

Thus far only a few varieties of potatoes have been tested at the farm, and it would probably not be worth while to test a large number of kinds at present. The bulk of seed used this season is of the Burbank variety grown in California; two or three varieties from Vladivostock have just been planted. The present area in potatoes is about 25 and may reach 35 hectares this season. The whole farm comprises some 700 hectares. An excellent idea, which is being carried out so far as possible, is the rotation of potatoes with legume crops; theoretically this plan would eventually reduce the amount of artificial fertilizers required to a very great extent, but since time is a great object in the turning out of the crops, it has been necessary to apply very large amounts of commercial fertilizers. It may

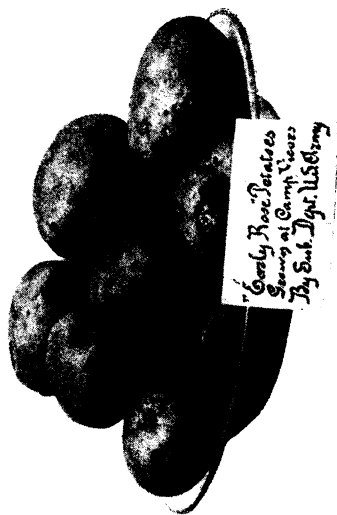
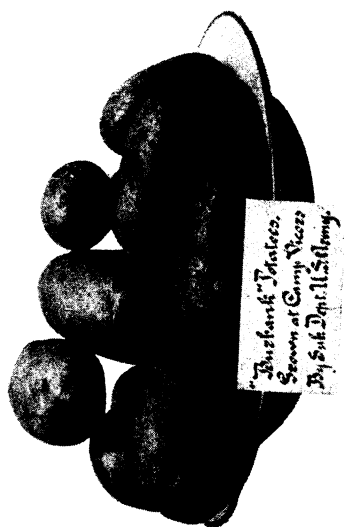


PLATE II.—POTATOES GROWN AT THE CAMP VICARS POTATO FARM.

be found possible to raise two crops of potatoes and one of beans or peanuts every twelve months by this rotation system. During the past season the largest plantation of Lyon beans (*Mucuna lyoni*) ever made was put out on the area now occupied by the potato fields, with the idea of "taming" the raw soil somewhat; these beans, like the Florida velvet variety, do not, however, produce a good growth the first season unless their bacteria assistants exist already in the soil at the time of planting.

It is impossible to prophesy definitely as to the degree of success which will attend the very praiseworthy efforts of the subsistence department, but considering the excellent soil, the location, the enthusiasm and ability of the present superintendent, Lieut. J. N. Walling, the present crop, unless unusually serious blights prevent, will probably be sufficiently large to convince all skeptics that potatoes *can* be grown cheaply and well here in the Philippines.

FIELD OPERATIONS AGAINST RINDERPEST IN THE PROVINCES OF BULACAN AND PAMPANGA.

By ARCHIBALD R. WARD, *Chief Veterinarian.*

Experience in combating rinderpest in the past has emphasized the necessity for concentration of effort within comparatively limited districts in order to bring to bear upon the work the necessary facilities for accomplishing the desired result. The difficulties of the work are such that it is quite impossible to ever have enough veterinarians and sanitary inspectors to find simultaneously all the centers of infection in these Islands, or to have sufficient guards available to control the disease when found.

The records of field work against rinderpest show large numbers of instances of success in eradicating it in small areas. Usually such gains are associated with corresponding losses in near-by localities, due to lack of a force sufficient to cope with the needs of the situation. The net result has been in general no gain in clean territory because the blows delivered have been insufficient to accomplish the work completely. The men were scattered, one, or at most two or three, in each province where rinderpest was known to exist.

When the necessity to concentrate the operations was recognized, the distribution of rinderpest was such as to indicate the desirability of beginning operations in the Province of Bulacan. South of this province the disease was known to exist on the Island of Luzon in only two centers in Batangas, on which as many men as could be used were at work. North of Bulacan the disease was distributed in Pampanga, Tarlac, Nueva Ecija, and Pangasinan to an extent not at all accurately known to representatives of the Bureau of Agriculture. Likewise an undetermined amount of infection was scattered through the Provinces of Nueva Vizcaya, Isabela, and Cagayan.

During the past few years rinderpest has appeared from time to time at various points in and between Bulacan and Pangasinan. Time and again portions of this territory have been reported clean, but at no time has the whole area been free from

the disease. Extensive trade routes radiating from Calumpit, and extensive movement of cattle and carabaos southward, are regarded as largely responsible for the instances of reinfection. At present the field work against rinderpest is carried on along the lines indicated in the following instructions to field men:

DEPARTMENT OF PUBLIC INSTRUCTION,
BUREAU OF AGRICULTURE,
Manila, December 12, 1910.

SPECIAL ORDER }
1910-11, No. 10. }

FIELD METHODS OF COMBATING RINDERPEST.

Present plans contemplate a campaign of total eradication in certain districts without the use of serum. Serum profoundly modifies the course of the disease, and sometimes masks the symptoms, which result is undesirable, as it prevents the discovery of the cases. The assembling of the animals for injection with serum also favors the spread of the disease.

It is desired that field work be directed primarily toward the restriction of movement of cattle from one locality to another. In the infected area and its immediate vicinity extraordinary efforts should be made to isolate each individual animal. If conditions prevent this, animals should be segregated in as small groups as possible. The assembling of the animals of a barrio on a common pasture should be prevented. Owners will be put to extra trouble, but should be induced to supply food and water of unquestionable safety. The method of combating rinderpest by the isolation of individuals and patrol of the district twice daily has given promising results in the field.

The extent of the areas in which the use of animals shall be prohibited must be left to the judgment of the veterinarian in charge. In cases where, in his opinion, animals are absolutely necessary for putting in a crop, barrios might be divided into small quarantine districts carefully and efficiently guarded, with frequent inspection of the animals. Make the extension of such privilege, where safe, dependent upon the character and extent of support by local officials. Yield as little in this regard as possible.

There are provinces where the force is hopelessly inadequate to carry out the foregoing recommendations at present. The policy in these places should be the application of palliative measures to keep down the death rate by use of serum. Under no condition should more animals be assembled than are actually in immediate contact with one another. Keep one man to spray the stocks after the injection of each animal. Better yet, assemble no animals from the immediate vicinity of a case.

Experiments at Alabang have shown that serum in doses of 100 cubic centimeters per animal, injected just previous to infection, will save a large percentage of Batanese cattle weighing from 175 to 250 kilos. Experiments with carabaos are in progress. There is no evidence, as yet, that the injection of serum weeks before infection will save the lives of the animals.

Men in the field must realize how difficult it is for the main office to lay down any definite rules for carrying on the work in the field. Regulations which are ideal to one province or locality are entirely inapplicable in other districts. On account of this, field work should be carried out in the spirit of these instructions, but modified, if necessary, to fit conditions.

G. E. NESOM, *Director of Agriculture.*

Many cases and outbreaks are not reported; representatives of the Bureau of Agriculture must search for them. To facilitate the discovery of cases arrangement is made with local officials to have all the animals of a barrio restrained at convenient points on a certain day for inspection. All suspected of showing early symptoms of rinderpest are tied where discovered until the diagnosis is completely verified to the satisfaction of the veterinarian in charge of the district, after which they are quarantined. This precaution avoids the danger of quarantining animals as a result of a mistaken diagnosis. When a case is verified all the cattle and carabaos that have been in contact with the disease are tied up for ten days to give time for the incubation of the disease. This is necessary because it may take fully this time for an animal to develop distinct symptoms.

Cases of rinderpest, after the verification of the diagnosis, are taken to a quarantine corral, great care being exercised to disinfect the dejecta deposited en route. The ground in the vicinity of a recently discovered case is thoroughly disinfected. Mudholes are likewise disinfected. The cases are kept in the quarantine corral under guard until the animals die or completely recover. Infected animals that survive are confined in the quarantine corral for thirty days after the attack. The corrals are built with a double inclosure of bamboo so constructed as to exclude small animals and chickens. The cases are cared for in the inner inclosure by a special attendant. The larger, outer inclosure is large enough to provide space for burying the dead. Fodder is brought by the owner to the outer fence and is taken in charge by the corral attendant. The corral and surroundings are kept scrupulously clean and the ground is sprayed twice daily with disinfectant. Upon leaving the corral the attendant disinfects his feet, hands, and all parts of his clothing which may have become infected. Care is taken to locate the corral on a spot where the drainage will not subject adjacent land to infection. Where necessary, the lot is surrounded by a deep ditch.

The restraint of movement of animals is the most important factor in measures against rinderpest. Experience has shown that a guard of Constabulary soldiers is the most effective means of controlling the spread of the disease from known centers of infection. Animals in immediate contact with cases are quarantined. Pigs, goats, and sheep are not allowed to run at large. The whole barrio is quarantined when disease exists within it. Movement of work animals within an infected barrio is prohibited in all cases when such measures do not conflict with agri-

cultural operations vital to the prosperity of the community. In quarantined barrios when the internal movement of animals is allowed, communication with the outside is permitted by transfer of freight across a narrow zone in which no cattle are allowed. Infected barrios are held in quarantine for ten to fifteen days after the death or recovery of the last case.

For present purposes the recent history of the disease in Bulacan may begin with the weekly report of September 17, 1910, when the province was reported clean. This may, or may not have been accurate, for one veterinarian was at that time responsible for both Pampanga and Bulacan. Even with the assistance that he had from an American and a Filipino sanitary inspector in the latter province the task was quite impossible to perform perfectly. A week later infection was found in two municipalities, involving four barrios. Coincident with the beginning of a systematic campaign of eradication in Bulacan, a ten days' quarantine for cattle and carabaos was established against Nueva Ecija and Pampanga, by provincial ordinance. On October 1 accession to the field force of one veterinarian and a Filipino inspector brought to light infection in another municipality, making the total barrios known to be infected four. For another month the field force was gradually increased to three veterinarians, one American and two Filipino inspectors, as they could be spared from elsewhere. In the meantime the number of infected barrios had risen to seven. The apparent inconsistency of an increase of infected barrios coincident with an increase in the field force is explainable by the fact that more men disclose more disease. A week later the field force consisted of two veterinarians, four American and four Filipino inspectors. This force augmented by the Constabulary was sufficient to make gains against the disease. The number of infected barrios remained at five during the three weeks ending November 19. On November 26 the infection was restricted to two barrios in the municipality of Angat. After December 7 no case occurred until January 5, when one was reported. It is interesting to note that this case occurred in the barrio where serum had last been used over a month before, and in fact the only one where it had been used for a long time.

As various barrios had been freed from disease in November, the men systematically searched the province for rinderpest. On December 1 there were seventeen men at this work, all of whom were trained to detect the disease. No further cases being found, on December 1 the main body of workers was trans-

ferred to Pampanga, leaving Bulacan still under the surveillance of four veterinarians and three Filipino inspectors.

To protect Pampanga from the danger of further infection from the north, quarantine was established against Nueva Ecija and Tarlac. Tarlac in turn established a quarantine against Pangasinan. Thus, a carabao traveling from Dagupan to Calumpit would consume thirty days in passing the various provincial borders. Travel by rail was likewise impeded. Cattle and carabaos were allowed to be unloaded in each province only at the northernmost station, where they were quarantined for ten days before distribution in the province.

In Pampanga the infected area had expanded from two barrios of the municipality of Mexico on September 3 until, on November 27, it involved seven municipalities. On December 3 thirteen men began the search for disease but only disclosed three new infected municipalities. During the week ending December 10 the disease was present in ten municipalities, involving sixteen barrios.

At this date the campaign was being waged by forty-one Constabulary soldiers, thirty-six municipal police, twenty provincial Filipino inspectors, nine native Bureau inspectors, nine American inspectors, and four veterinarians, one hundred and nineteen in all. On December 24 the force was increased by thirty-two Constabulary soldiers and two officers, together with more American inspectors. At this date the force at work consisted of one hundred and sixty men. As a result, on the week ending December 31 cases of rinderpest were present in only five municipalities, involving seven barrios. A week later the infection was discovered in another municipality, bringing the number of infected barrios up to ten.

Experience in Pampanga shows the necessity of concentrating forces, for the number of men there at present is barely sufficient to hold the disease in check and to scrutinize all the animals of the province in the search for disease. While progress in controlling known centers has been very satisfactory, new cases will be discovered from time to time and prolong the work. It will be a matter of months before it will be safe to regard the province as absolutely clean of the disease. When this conclusion is reached, the force will be moved northward and concentrated in portions of the territory in the Provinces of Tarlac and Nueva Ecija no larger than can be thoroughly covered by the force.

The prime consideration is to conduct the work with such thoroughness as to leave no infection behind. Experience with

rinderpest has been such as to make it reasonable to hope for such a result.

There are at present places to the north of the present field of operations where rinderpest is causing more loss than would be occurring in Pampanga if the force were entirely withdrawn. However, if rinderpest is ever to be eradicated from Luzon it must be done by extending the area at present free from infection and not by attacking the disease in widely separated localities. Labor in cleaning certain spots surrounded by infected areas would be wasted.

SOME SUGGESTIONS FOR POULTRY RAISERS IN THE PHILIPPINES.

By GEORGE SEAVER.

SELECTION OF STOCK.

The beginner should study the different varieties of poultry until he can select the one variety that suits him best, then make a selection and study that breed thoroughly and learn to judge of the good and bad points so that he may cull his flock intelligently. The Mediterranean breeds, such as white, brown, buff, and black Leghorns, and the Minorcas, both white and black, and Spanish, are doubtless best for this climate as they originate in warm countries, and are light, sprightly, and energetic. They are known as the egg varieties. The Leghorns are the standard by which the egg yield of other breeds are judged and occupy about the same position in the poultry industry as does the Jersey among cattle. But any standard variety intelligently handled is quite sure to be profitable, while to breed scrub or mixed breeds is almost sure to mean failure.

Careful and scientific breeding, and breeding only from the soundest, most vigorous specimens have produced in standard varieties stamina and vitality, greater resistance to disease, earlier maturity, and greater fertility than it is possible for any scrub to possess. Statements that the scrub is hardier or more robust than carefully bred thoroughbreds is erroneous and absurd. Of course, if one expected to give them no attention or turn them loose in a jungle to provide for themselves, the wild chicken would prove more adaptable, but given the same care and ration as domestic stock, the thoroughbreds will prove themselves stronger, more capable, and much more profitable.

EGG PRODUCTION.

Egg production is the most profitable branch of the poultry business, the returns being sure, quicker, larger, and more reliable, and as we import over ₱250,000 worth of eggs a year, the market is in no danger of being overstocked.

Different breeds lay different shaped, sized, colored, and flavored eggs. The varieties mentioned above lay large white shelled, fine flavored eggs, each weighing from $2\frac{1}{4}$ to $2\frac{1}{2}$ ounces. Many of the native game or scrub hens lay strong, rancid flavored eggs, owing to the infusion of the wild blood from which they are descended, and seldom eggs that weigh more than $1\frac{1}{4}$ ounces. The color of shell and yolk is seldom uniform, and it is rare for one of these hens to lay more than 60 eggs a year, while the Mediterranean varieties above mentioned will lay from 150 to 220 eggs a year, and commence laying when five or six months of age, while the scrub seldom lays under nine months. A Leghorn will lay three times as many eggs as the scrub and one Leghorn egg will weigh as much as two scrub eggs, of incomparably better color and flavor, uniform in size, color of shell and yolk, and consume no more food than the scrub.

If one starts with full-blooded fowls of any standard breed, it will always be possible to sell a considerable number of eggs for incubator purposes for which fancy prices may be asked and which will be readily paid. It is always best to guarantee satisfaction and if your hens are well mated and cared for you will seldom have to refund or make good. Selling high-class eggs for incubator purposes is the highest branch of the poultry business and should be treated accordingly. The buyer is trusting to the seller's honesty in delivering what is paid for, and relying on his judgment in mating his hens, so that to be successful one must act in good faith with his customers. It is always better to lose the price of a setting of eggs than to have a dissatisfied customer. The hens in mating pens should be strong, vigorous, well matured, and not less than a year old.

Select bright-eyed, energetic hens, wide across the fluff, long bodied, wings closely carried, head high, breast well up and full. With the egg or light varieties, one cock to fifteen hens is sufficient, although if two cocks to the pen are kept, letting them run with the hens on alternate days and spending the days off the run in a clean and light coop with plenty of food and water will pay for the extra labor in greater fertility of eggs, more vigorous chicks, and a longer period of usefulness for the cock. There is quite a steady demand for eggs for incubating all the year, but it is better to break up the mating pens in July, giving the hens all possible range, and mate them up again after the rainy season or about November 1, as the fowls have then about completed their molt. No eggs should be sold from the breeding pens till ten days after the cock has been in the run. Eggs for table use should be from hens hav-

ing good range and not mated. No cock should be allowed with any hens except the breeding stock. Hens will lay more and better eggs, and sterile eggs always bring better prices than fertile eggs in choice trade. They will keep better and have a more appetizing appearance when served.

Gather eggs frequently and deliver them as soon as possible to your customers; sell only clean and graded eggs, and the care they have been given will be repaid with interest by satisfied and contented customers, who will be only too glad to pay a good premium over the market price.

RUNS AND TYPE OF HOUSE.

Make the runs as large as possible. Small, bare runs will force you to feed green food as a substitute for grass and this class of feeding is never quite satisfactory. A chicken is one of the most adaptable of living creatures and if properly cared for may be raised and kept in a cage or coop hardly large enough to turn around in, but the care necessary to raise chickens is multiplied as you decrease the range. Small ranges must be kept clean and frequently spaded, and this is one of the first things neglected by the amateur poultry keeper, with disastrous results. Unlimited range is, of course, best, but if this is impossible, good grass runs are next best. Where green food must be fed, fill a bucket half full of palay, wet thoroughly, cover with a sack, and feed as needed after it has sprouted. Also feed green ground bone two or three times a week to all poultry in runs. If ground bone can not be obtained, scrap meat cut fine is almost as good. Care must be exercised to avoid ptomaine poisoning, as poultry is very susceptible to it with almost always fatal results.

Several types of houses have been tried and it seems that the most important thing—in fact, all that is required in this climate—is that the house be dry in the rainy season and furnish shade in the dry season. Iron roofs make the house extremely hot in the warm months unless placed high and ceiled. It seems that nipa makes the best roofing, being both dry and cool, but if once infested with vermin it will have to be destroyed.

Roosts should be near the ground, and the heavier the bird the lower the roost, as chickens flying from the roost to the floor frequently crack the bottom of the foot. This becomes infected, making the fowl very lame; frequently the entire leg becomes swollen and filled with pus, causing high fever and sometimes results fatally. This condition is sometimes called bumblefoot in the United States, often miscalled beriberi in the Philippines. For the light varieties the roosts may be placed 1.5 to 1.7 meters

from the floor, as they are more easily cleaned and worked under. A stick of timber 2 by 2 inches, with the edges rounded off, makes a good roost, and the nearer the ground it is placed the better. Dropping boards placed under the roosts make the work of cleaning out much easier and sanitary conditions much better. Roosts should all be the same height, otherwise the fowls will crowd to the highest roosts.

Nests are the next feature to be considered and are better placed low or near the ground and in the darkest part of the house. Different kinds of nests are highly recommended, but I have found nothing better than an empty oil case nailed to a post 6 inches above the floor, and part of the side taken off to make access easy. Tobacco stems make good nesting material as they keep out lice and mites and are very cheap, about ₱2 a thousand kilos at the cigar factory.

Hoppers, or self-feeders, have little to recommend them except the time saved in feeding, and frequently fowls injure their combs in greedy reaching after choice grains. A shallow box serves the purpose, is easily cleaned, and easy of access.

The earthenware base for large-sized flowerpots makes a fine water dish, is easily cleaned and inexpensive. Fresh water should be given every day and vessels washed clean.

INCUBATORS.

If one is going to handle poultry on a very small scale, it is possible to get along without an incubator, but it is almost impossible if large numbers are to be hatched or a plant of any size established. The machinery has not yet been made that will hatch as large a percentage of eggs as the hen, provided she attends to her business and does not die while setting, two conditions that have to be reckoned with. The incubator chicks are free from vermin when young, something that is practically impossible with hen-hatched chicks. Owing to the very slight changes of temperature in the Philippines and the humidity always present, artificial incubation is very easy. Any standard machine is sure to give satisfaction, and I doubt if there is an incubator made that would not work successfully under conditions here. No cellar or specially built house is necessary. Use the best oil, follow closely the directions that come with the incubator and do not spoil the hatch with overattention. Poor oil and too much attention spoil more eggs than all other causes combined. Handle the eggs as little as possible both before and after placing them in the incubator. See that the incubator sets level and place each leg in a can of water or the ants will kill the chicks before they leave the shell.

CARE OF YOUNG CHICKS.

After the chicks are hatched they should be left in the nest or incubator without food or water for twenty-four hours. Nature has provided for their first day's subsistence. The last act that the chick performs before breaking the shell is to absorb the yolk, which makes food unnecessary for at least two days, and dangerous if given before twenty-four hours, as the youngster must completely digest the yolk before adding to the food or white diarrhea will result. The first feed should be hard-boiled egg ground fine, shell included, and mixed with six times its bulk of oatmeal or rice bran (*tiqui-tiqui*). This food is continued until they are a week or ten days old, then feed them broken rice (*binlid*), or any of the crushed horse feeds sold in Manila. Artificial heat is not necessary in the brooder in this country. Put some soft straw in a box with a curtain across the open side, give them a grassy pen to run in, plenty of clean, fresh water to drink, and they will thrive. As soon as it is possible to tell the cockerels from the pullets, separate them; place all cockerels in a run by themselves, and allow the pullets all possible range. Cull the cockerels severely, keep only the very best and sell the rest for table purposes. Pullets should not run with the male until after the first molt, then, as they are something over a year old, chicks will be strong and vigorous.

FEEDING THE LAYING STOCK.

Only good, clean food should be given laying stock, but plenty of it, as there is little danger of a laying hen becoming too fat if she has a good range, and it is well to bear in mind that you expect her to deliver each day an egg containing over 2 ounces of highly concentrated food, and feed her accordingly. Vary the ration as much as possible, but be sure that she can get only plain, fresh, odorless food, otherwise the flavor of the eggs will be impaired; onions, garlic, or fish will very noticeably affect the taste of the eggs. It is unreasonable to expect a hen to furnish high-grade eggs when poorly fed, and if allowed to eat sewage, the eggs are not fit for human consumption. If the stock is confined in small or medium runs, special care must be used to give variety to the ration and supply green food. Sprouted rice, as before mentioned, is good and cheap, but lawn clippings can always be obtained and will be found of value.

It has been found advisable to keep dry mash for laying hens so that they may help themselves. Any of the crushed foods sold for horse feed in Manila are splendid poultry food as they contain crushed oats, cracked corn, wheat bran, cracked peas and beans and barley, about the balanced ration recommended by the Bureau

of Animal Industry of the United States Department of Agriculture. At present prices it will cost about ₦20 to feed a hundred hens of light breed a month on this feed. A mash may be made from rice products, rice bran, broken rice, and cracked corn that will do very well. It is cheaper than prepared crushed food, but not so good.

A box of charcoal should be kept in each pen, also broken shell, which may be obtained either from the button factory or fish markets at very small expense. Green ground bone is a very valuable addition to the feed, but should be fed sparingly, about 2 ounces to the fowl, two or three times a week. Fresh water must be given daily and drinking vessels kept clean. This is important.

DISEASES OF POULTRY.

Under this head may be outlined briefly the causes, symptoms, and treatment of such of the most common chicken diseases as have come to the writer's notice and a glossary of diseases that may be expected to affect the flock in this country.

ANÆMIA.

Cause: Lack of rich blood.

Symptoms: Comb and wattles abnormally white, limbs cold, fowl droopy and listless. Caused by poor food, unsanitary surroundings, overcrowding, and sometimes too much inbreeding.

Treatment: Clean yard and houses, disinfect, feed better food, introduce new males.

APOPLEXY.

Cause: Diseased condition of brain, too much blood, over-fatness, stimulating food, intense heat, derangement of digestive organs, overstrain in laying hens. Quite common in this country; not contagious.

Symptoms: Comb becomes dark red or purple, fowl staggers when attempting to walk, frequently falling from roost.

Treatment: Temporary relief may be obtained by pouring cold water over the head; shorten rations, omit pepper or condition powders, give purgative by putting a tablespoonful of Epsom salts (sulphate of magnesia) in every quart of drinking water. Most likely to affect show or pampered fowls.

BRONCHITIS.

Cause: Foul air, overcrowding, unsanitary conditions, exposure to heavy rain, damp houses. Not contagious.

Symptoms: Inflamed condition of bronchial tubes with quantity of mucus in throat, discharge from nostrils, eyes inflamed, difficulty in breathing, rattle in throat, and cough. This disease

is very similar to roup except that the latter has an offensive odor from mucus discharge. (If a disagreeable odor is noticed in handling the fowl, put it in quarantine or kill it immediately, as roup is very contagious.)

Treatment: Clean up, whitewash building, stop overcrowding, put a lump of gum camphor as big as the end of your thumb into every quart of drinking water.

DYSENTERY OR DIARRHEA.

Cause: Irritating matter in the intestines, sour and unwholesome food, exposure to wet weather, too much meat in ration.

Symptoms: Excessive looseness of bowels.

Treatment: Half a teaspoonful of castor oil, shorten ration, feed grain whole or coarse cracked grain, put a little alum in drinking water.

GAPES.

Cause: A small round worm with a smooth body and round pointed tail, and about 1 centimeter in length. They locate in the windpipe and cause suffocation. This disease generally appears after a rain, supposed to be connected with earth or angle worms as it almost always appears after worms have been eaten.

Symptoms: Generally affects chicks under three months. They will be observed to open their mouths and gape, which is accompanied with a choking cough and slight internal swelling of the throat. Very common and quite fatal in the Philippines.

Treatment: Wet a feather in turpentine and pass it down the bird's throat. One or two treatments will be sufficient.

FLAVUS OR WHITE COMB.

Cause: Parasite. Very contagious. Quite common in this country.

Symptoms: Small irregular white spots on comb and wattles that soon become confluent.

Treatment: Isolate all birds affected and bathe the parts in any good antiseptic, rub with carbolated vaseline.

ENLARGED LIVER.

Cause: Overfat, lack of exercise. Not contagious, very common.

Symptoms: Droopy appearance, lowering of wings, pronounced lameness in right leg.

Treatment: Starve for two days, sulphate of magnesia in drinking water, shorten ration.

ROUP OR CONTAGIOUS CATARRH.

Cause: Filth, cold and damp houses, foul drinking water. Very infectious; the worst poultry disease we have to contend with.

Symptoms: Same as bronchitis, except that roup has an offensive odor from discharge which becomes cheesy, and eyes and entire head are inflamed. Progress of disease very rapid.

Treatment: Unless the fowls are very valuable, destroy them as they become infected. Clean runs, disinfect houses, use water solution of potassium permanganate, inject full strength peroxide of hydrogen in nostrils, drop 1-grain quinine tablets into throat, also tablespoonful sulphate of iron to each quart of drinking water.

WARTS OR CHICKEN POX.

Cause: Unknown, generally considered to be a blood disease. Very contagious and probably causes more poultry loss in this country than all other diseases combined.

Symptoms: First, fever, or incubating stage, later followed by eruptions or warts on head, rapidly becoming confluent, frequently destroying eyesight.

Treatment: Mix $1\frac{1}{2}$ ounces flowers of sulphur with each quart of mash, sulphate of iron in drinking water, keep runs and houses clean, feed green food, and consider yourself lucky if you save 50 per cent of your growing stock. It seldom affects chicks over four months of age.

CONCLUSION.

The most important of all the factors that make for success is cleanliness. You may neglect every other requirement and, if lucky, escape serious results, but if filth is allowed to accumulate, failure is as sure as the passing of time. The dust bath is the fowl's method of keeping itself clean and free from vermin. Damp houses and wet runs are the cause of much sickness, as the hens will molt during the rainy season and the worst weather strikes them when least able to resist disease. July, August, and September are the months most likely to discourage the poultry keeper. When the molting season arrives, it is well to confine birds, and feed them very lightly for several days to stop laying. Then add a spoonful of oil meal or ground copra to the mash, and, after they stop laying, feed well. The flock will shed off and clean up together, and therefore present a better appearance. A little sulphur added to the food during molting season is good.

A DANGEROUS NEW WEED IN THE PHILIPPINES (SPREAD OF "LANTANA CAMARA" IN NEGROS).

By O. W. BARRETT.

This shrub, presumably introduced from Mexico along with many other tropical American weeds and ornamentals, has assumed, during the past two or three years, an alarming character. The seeds, carried by birds, remain viable for a considerable time and germinate whenever and wherever they find sufficient moisture, the young seedlings showing such vigor that they have little difficulty in outstripping the other weeds about them.

This plant, which gave the Hawaiian planters so much trouble a few years ago, is very likely to repeat its record as a pest in the Island of Negros, and probably in other locations in the Philippines. The superintendent of La Granja Modelo states in a recent report: "Where there were a few scattered bushes in this part of Negros two years ago there are now thousands. At this rate it will be but a few years before all of the uncultivated land in this province will be covered."

The attention of all landowners, where this shrub is now found, is called to this matter with the hope that they will at once attend to the eradication of the weed before it spreads beyond control. The process is simple, consisting in loosening the root system (which is fortunately very weak) by means of a pick, or even a strong wooden stake, and then chopping off the roots just below their union with the stem; the uprooted shrubs should be thrown into a pile and burned as soon as sufficiently dry.

This weed is easily recognized by its round, close, button-like head of reddish or yellowish flowers which are borne near the tips of the branches; the colors of the flowers in these roundish masses varies with their age; that is, an individual flower which opens in the center of the cluster is of a pinkish or yellowish shade but turns reddish or purplish after a few days as the cluster unfolds. The separate berry-like fruits,

only 3 to 6 millimeters long, become when ripe bluish or blackish in color and are eagerly eaten by birds; this latter fact is a very important feature in the rapid spread of this pest.

The plant lives an indefinite number of years, becoming eventually a shrub or bush some 3 to 5 meters high; most of the plants in evidence in Occidental Negros are only 2 or 3 meters high at present.

This weed is now being exterminated on La Granja Modelo, and it is hoped that similar action will be taken on all plantations where it has gained a foothold.

MONTHLY VETERINARY REPORT—DECEMBER.

The following provinces were considered free from rinderpest during the month of December, 1910:

Albay.	Cavite.	Samar.
Ambos Camarines.	Ilocos Norte.	Sorsogon.
Antique.	Ilocos Sur.	Tayabas.
Bataan.	Laguna.	Zambales.
Benguet.	La Union.	
Capiz.	Rizal.	

Surra was not reported in any of the following provinces during the same month:

Ambos Camarines.	Moro.	Nueva Ecija.
Antique.	Ilocos Norte.	Pampanga.
Bataan.	Iloilo.	Rizal.
Batangas.	Isabela.	Sorsogon.
Benguet.	Laguna.	Surigao.
Bohol.	La Union.	Tarlac.
Capiz.	Misamis.	
Cavite.	Negros Oriental.	

Eleven provinces may be considered free from rinderpest and practically free from surra. At present, the provinces suffering the greatest losses from rinderpest are Pangasinan, Oriental Negros, Leyte, and the Moro Province. Rinderpest has existed in two or three municipalities in Pangasinan for several months. Recently the number of infected municipalities in Pangasinan has been increased to 6. During the week ending December 31, 1910, there were 159 cases of rinderpest in that province. Sixty-five of this number were found during the week mentioned, while the others were old cases which had been discovered during the previous week. The total number of deaths from rinderpest during the week was 55. In the Province of Oriental Negros during the week ending December 24, 1910, there were 19 cases of rinderpest, 6 of which were discovered during the week. The number of deaths for that week was 11. In the Province of Leyte so few of the towns have telegraphic communication that it is impossible to give the exact number of cases and deaths during the last part of December, 1910, but former reports indicate the situation to be about the same as in Oriental Negros. There were, in all, 5 infected municipalities.

Undoubtedly, the recent losses have been heavier in the Davao district of the Moro Province than in any other part of the Philippine Islands. At present the number of deaths averages about 100 each week, and the infected territory includes a large area along the Gulf of Davao, north and south of the municipality of Davao.

On November 30, 1910, rinderpest existed in 50 municipalities and 16 provinces. On December 29, 1910, there were 41 municipalities and 16 provinces infected. At the time of going to press this number has been reduced to 36 municipalities and 13 provinces. On November 30, 1910, there were 19 municipalities and 10 provinces infected with surra. On December 29, 1910, this number had been increased to 21 municipalities and 15 provinces. During the past month the Provinces of Bohol, Bulacan, Nueva Ecija, Nueva Vizcaya, and Surigao have each had one municipality infected with rinderpest. In the Provinces of Cebu and Cagayan, there have been 2 infected municipalities, but very few cases of disease. Since December 31, 1910, there have been 9 municipalities infected with rinderpest in the Province of Pampanga, but in this province there has been a large force of men for the past two months, and the number of infected municipalities has been reduced to 5. In this province there has not been a large number of cases, and the disease has caused very little loss. Although surra has existed in a number of municipalities of the Archipelago, it has appeared only as occasional cases and has apparently caused no serious losses in any part of the Islands.

MONTHLY CROP REPORTS—DECEMBER.

ABACÁ.

Ambos Camarines.—The price of abacá is so low and the quality produced in this province is so poor that it hardly pays the laborers for getting it to market.

Tayabas (Marinduque).—A comparatively small amount of abacá was harvested during November on account of the rainy season and lack of transportation.

COFFEE.

Cotabato.—Coffee to the amount of 12 piculs was shipped from Cotabato during the month of November.

Mountain Province.—The barrios of Lubon and Sumadel lying in the country north of Cayan, and very seldom visited by Americans, are literally smothered in coffee trees. It is reported that as much as 500 cavans of coffee are sold from there each year.

CORN.

Cagayan.—The small amount of corn planted in the coast towns has yielded well. In Tuguegarao corn has reached the uncommonly high price of ₱4 to ₱6 per cavan.

Cebu.—The corn crop is being harvested in a number of different localities and is giving a good yield. Considerable corn on the west coast has been damaged by the extensive rains.

Iloilo.—In the southern part of the province a large amount of corn is now being planted on the hillsides.

COTTON.

Ilocos Norte.—The following areas are now planted to cotton: Vintar, 12 hectares; Piddig, 500 hectares; Laoag, 223 hectares; Paoay, 150 hectares, and San Miguel, 150 hectares.

Mountain Province.—The Ifugaos of Kiangnan grow some cotton on irrigated patches from which the women weave a fine grade of cloth. The Bontoc, Kalinga, and Lepanto districts appear to be too high for cotton, as one never sees it in these subprovinces.

ORANGES.

Batangas.—The Tanauan orange crop has been one of the largest ever known. The greater part of the Tanauan country has been planted to young orange trees which are from 1 to 3 meters high.

RICE.

Bataan.—The rice crop in this province was nearly all cut and stacked by the 20th of December. The crop is reported to be about an average one with some fields short on account of the drought early in the season.

Bohol.—The rice plantations have suffered somewhat from windstorms, but no great amount of damage has been done. Rice planting is now going on in certain municipalities for the first crop of 1911.

Cagayan.—In the southern part of Cagayan Province the yield of rice is said to be much better than last year.

Cebu.—Owing to the abundant rains the rice crop now being harvested on the east coast will be heavy.

Cotabato.—Palay continues to arrive in Cotabato from the upper river country in large quantities and during the month of November 2,210 cavans were shipped by the Chinese merchants to Davao, Manila, and Dumaguete. One thousand four hundred and sixty-two cavans of rice, which had been cleaned in a rice mill at Cotabato, were shipped to Jolo and Manila. Considerable palay will be harvested during the month of December in the upper river country and the Malita River section.

Ilocos Norte.—Badoc possesses some of the richest rice land in the Province of Ilocos Norte. It is estimated that 3,590 hectares have been planted to rice this year. The farmers state that the rice crop in Badoc will be larger and of a superior quality to that of the previous year. Vintar stands second in rice production in the Province of Ilocos Norte. The records show that this town has 13,866 hectares of rice under cultivation. The crop in this town will be larger and superior in quality to that of last year. Piddig is raising some excellent rice. The records of the municipality show that 3,380 hectares of rice are under cultivation. The crop presents an excellent appearance and promises a larger yield than last year. Batac is the largest rice-growing municipality in this province. The records show 16,654 hectares of rice under cultivation. The crop presents a good appearance and promises a larger yield per hectare than last year. Laoag has little or no irrigation and for this reason produces an inferior quality of rice. The records show 3,113 hectares planted to this crop. The rice crop

will be larger and superior in quality to that of last year. Paoay has 2,000 hectares planted to rice which promises a larger yield than last year. San Miguel, on account of its location in the mountains, has a very small area of rice land. The records show 516 hectares planted to rice. The crop is in good condition and promises a larger yield than last year.

Iloilo.—The first rice crop, which should have been harvested in October and November, was a complete failure in the municipalities of Jaro, Santa Barbara, Cabatuan, Janiuay, Pototan, and other places. The second rice crop, which will be 35 per cent short, will not be ready for harvest for some time, so that there is a period to be gone over with very little rice as compared with former years.

La Laguna.—The rice crop in the municipalities of Santa Rosa, Biñan, and Calamba, which was thought to be a failure, will furnish an abundant harvest. This is also true in the case of rice in other places in this province.

La Union.—Nearly all the rice crop has been harvested and the crop is a very good one. Many of the rice fields have been converted into tobacco fields, the planting of which is now in progress.

Mountain Province.—The harvesting of the rice crop is now finished and the Igorots are preparing the sementeras for the first planting of 1911, which will take place in January and February.

Tarlac.—Although Camiling, Concepcion, Tarlac, and La Paz have good palay, the crop for the province will be about 25 per cent short of last year.

Tayabas (Marinduque).—Harvesting of the rice crop was finished early in November and a fairly good crop was obtained. The planting of the second crop was started shortly after the first crop was harvested.

Zambales.—Nearly all the farming population in this province has been engaged in the harvesting of rice throughout the month of December. In the northern half of the province where beardless rice is practically the only kind planted the harvest is nearly completed and the grain in the stack. In the southern half of the province there are many Ilocanos who plant the bearded rice, and the harvesting of this variety is only well begun. In general this "palay Iloco" presents a very good appearance. Nearly all the municipalities report at least an average crop and some a better crop than last year. In some localities the rice crop is reported to have suffered from the drought of July and August.

RUBBER.

Cotabato.—The Rio Grande Rubber Company purchased 10 tons of gutta-percha during the month of November, and are shipping the same direct to London. The Chinese merchants during the month of November exported 835 piculs of gutta-percha and 4 piculs of rubber. During the month of November the Rio Grande Rubber Company received 50,000 Para rubber seeds from Singapore, and on November 25 the work of planting these seeds in the nurseries at Reina Regente was commenced.

SUGAR CANE.

Batangas.—There is a fine outlook for a big sugar crop.

Cebu.—The sugar crop is good but late. Cutting has not yet commenced.

Ilocos Norte.—The following areas are now planted to sugar cane: Badoc, 25 hectares; Vintar, 25 hectares; Batac, 190 hectares; Laoag, 1,047 hectares; Paoay, 200 hectares, and San Miguel, 108 hectares. The crop is in good condition.

Iloilo.—The grinding of sugar cane is being delayed by the continuous bad weather. The sugar planters are feeling somewhat dejected over the low price of sugar, it having fallen to ₱5.25 for No. 1.

La Laguna.—The cane fields of Santa Rosa, Biñan, and Calamba promise large yields, and the farmers are jubilant over the prospects for an excellent sugar crop.

La Union.—Sugar making has begun in earnest and those who are not actually engaged in this work at present are preparing to begin at once. The sugar cane crop is being harvested in some localities. It is estimated that the total production for the province will be about 6,000 piculs.

Occidental Negros.—Owing to the recent typhoon more or less sugar cane has been damaged, reducing the yield in many parts of the province. Grinding has commenced in the major part of the province, but is being much hindered by the continuous rains.

Tarlac.—Harvesting of sugar commenced during the month of November, and everyone agrees that the crop is going to be unusually large. The acreage is considerably larger than it was last year, but there is some uneasiness about prices.

TOBACCO.

Cagayan.—Considerable tobacco has been planted during the month in spite of the unfavorable weather. Although there has been an almost continuous downpour of rain but little damage has been done by floods.

Isabela.—The tobacco crop is nearly all in the hands of the buyers and the money therefor is rapidly going into the hands of peddlers on the river. Echague tobacco is not yet sold. Seed beds are out all over the tobacco district. Internal-revenue agents are now busy among the growers in an effort to induce them to strive for a better quality of leaf and better methods of handling. There appears to have been sharper competition than usual among the tobacco buyers this year. Buying did not start as early as usual and is not yet completed. The tobacco growers have a good supply of corn on hand and are not going into the market with their tobacco as avidly as formerly. There appears to have been a more general disposition on the part of certain buyers to buy by quality than in former years. It is surprising to a newcomer to note how little of the large amount of money which annually comes to this province stays here. Rice and other necessities are sold during the year at usurious prices, rice frequently being sold at ₱15 and more per sack. In Naguilian, a town where 1,450 cedulas were sold this year, a tobacco buyer states that about ₱200,000 were received by the tobacco growers and that the year's sales of *anisado* will amount to ₱30,000 or ₱35,000.

La Union.—Tobacco is being set out and the late light rains have been very beneficial to this crop.

MISCELLANEOUS CROPS.

Mountain Province.—In Tagudin the president is doing good work in having seed beds made from which he distributes plants to all who deserve and want them. Such methods bring better results than distributing the seeds promiscuously. It is noticed that tobacco and tomatoes are set out in quite large patches here. Present indications point to a successful year agriculturally for 1911. It will mark the real beginning of agriculture on a more or less scientific basis. Of course it will take some time for the natives to reach a satisfactory stage along this line, different methods will have to be applied to different sections, owing to climate, soil, etc., but the well-known patience of the Igorot will take him a long way along the road to success. It will mean to him better living, less work, and will give his boys and girls a chance for schooling, instead of their laboring in the sementeras as they do now from early youth.

CURRENT NOTES.

THE ENGLISH SPARROW IN THE PHILIPPINES.

After very nearly encircling the globe in its migrations, the English sparrow has become thoroughly established in the Philippines, and unless measures are promptly adopted to check the spread of this pest it will soon be impossible to exterminate the species by any ordinary means.

The following receipt for preparing a poisoned bait, as recommended by Mr. N. Dearborn, in Farmers' Bulletin 383, of the United States Department of Agriculture, is quoted here with the hope that all planters or owners of buildings in localities already infested by these birds will make use of it.

A poison mixture that has proved very effective is prepared as follows: Put one-eighth ounce of strychnia sulphate into three-fourths of a gill of hot water and boil until dissolved. Moisten $1\frac{1}{2}$ teaspoonfuls of starch with a few drops of cold water, add it to the poison solution, and heat till the starch thickens. Pour the hot poisoned starch solution over 1 quart of wheat and stir until every kernel is coated. Small-kerneled wheat¹ sold as poultry food, if reasonably clean, is preferable to first-quality grain, being cheaper and more easily eaten by the sparrows. A 2-quart glass jar is a good vessel to mix in, as it is easily shaken and allows the condition of the contents to be seen. If the coated wheat be spread thinly on a hard flat surface it will dry enough for use in a short time. It should be dried thoroughly if it is to be put into jars and kept for future use. Dishes employed in preparing poison may be safely cleaned by washing.

The poison should be well scattered so that many birds may be able to partake at the same time, since after a few are affected their actions excite the suspicions of their comrades. Usually a few sparrows get only enough strychnine to paralyze them for a few hours, after which they recover. It is important, therefore, to visit the feeding places two or three hours after distributing poison to prevent such birds from escaping. It is well also to remove dead birds promptly to avoid exciting the suspicions of those that are unaffected. In northern latitudes the best time to put out poison is just after a snowstorm, when other food is covered.

Sparrows should be baited in secluded places, safe from interruptions and where doves and poultry are not endangered. Roofs, back yards, and unused poultry runs are favorable situations. Proximity to low trees, grape arbors, and similar retreats has the advantage that sparrows go to

¹ Rice either husked or unhusked may be substituted.

such places between meals, and many dead birds will be found there well away from the bait. If undisturbed, poisoned birds will usually be found within a few feet of where the bait was spread, death occurring in from three to twenty minutes. Where doves or poultry are likely to be poisoned, the sparrows, after being baited, may be induced to feed in small covered pens made of coarsely meshed wire netting and having the sides raised about an inch and a half above the ground. There is practically no danger that cats or other animals will die from eating sparrows that have been poisoned.

Any wheat coated by the above process, which is overlooked by the birds, will become harmless after a few rains.

Sparrows can be reduced locally to almost any desired extent by the methods outlined above, but it should not be forgotten that such reduction can be made permanent only by systematic and continued efforts.

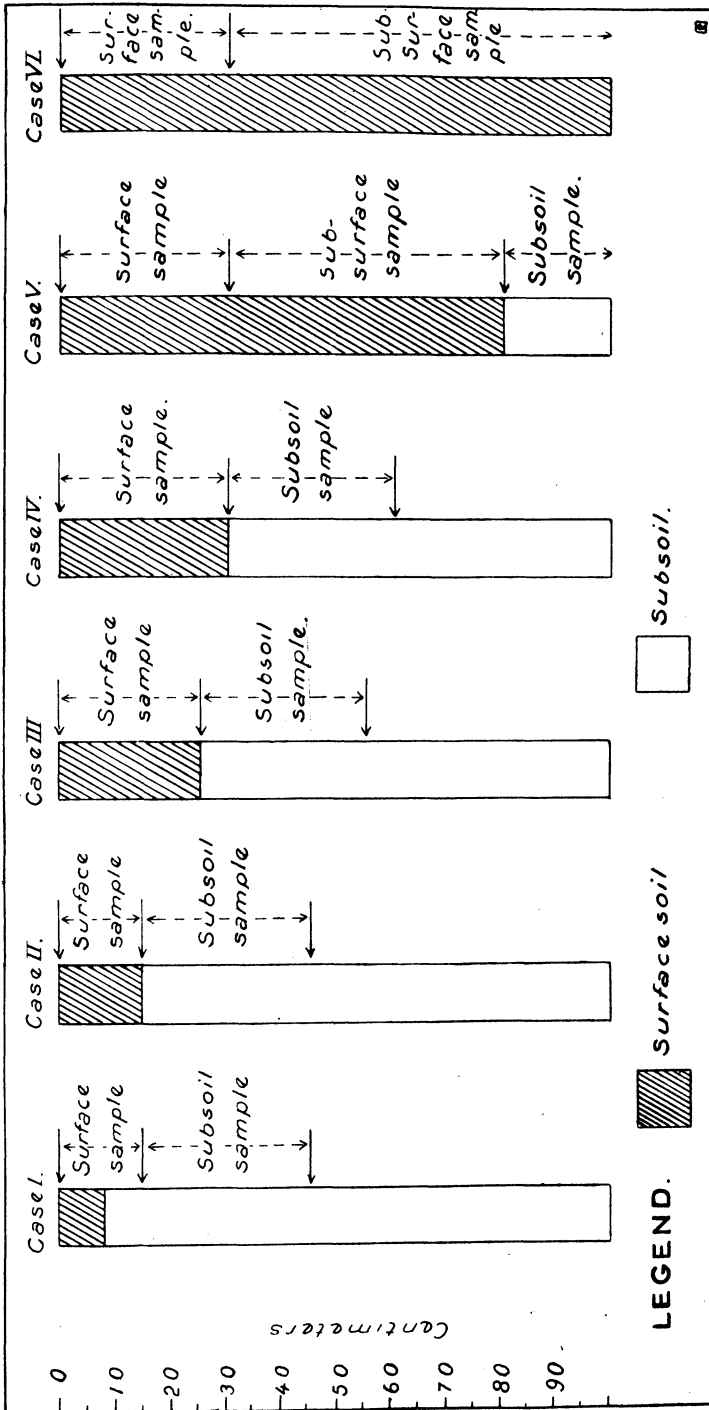
DIRECTIONS FOR TAKING SOIL SAMPLES.

Make a general inspection of the region, and select a representative field, i. e., one free from any modifications due to local conditions such as erosion, washing, etc. Inside the tract to be sampled, select five or six representative places, some distance from houses, fences, roads or trees and in cultivated fields midway between two plants, remove the surface accumulations of grass, leaves, or litter, and take samples with a soil tube or auger. A spade may be used if precautions are taken to dig a hole, one wall of which is smooth and perpendicular, to the proper depth and take the sample of soil from the side of the hole in a slice about 8 or 10 centimeters thick. Avoid mixing the layers of different depths. The sampling should be done preferably when the soil is reasonably dry, after the crop has been harvested and before fertilization.

Surface soil.—Sample each of the five or six spots chosen to a depth of 15 centimeters (6 inches) or to the change between the surface soil and subsoil, in case such change occurs between the depth of 15 and 30 centimeters, and place these together as representing the *surface soil*. *In no case is the sample to be taken to a greater depth than 30 centimeters (12 inches).*

If the surface soil extends to a greater depth than 30 centimeters, take a separate sample below the depth of 30 centimeters to a change between the surface soil and the subsoil, or to a depth of a meter if no change occurs. This sample of the *subsurface soil* should be obtained in other respects precisely like that of the surface soil.

Subsoil.—The depth to which the sample of subsoil should be taken will depend on circumstances. It is always necessary to know what constitutes the foundation of a soil to the depth of 1 meter at least, but in ordinary cases 25 or 30 centimeters will be sufficient for examination in the laboratory and should be taken in precisely the same manner as the surface soil.



Directions for taking soil sample represented graphically.

If the surface soil extends to a considerable depth below 30 centimeters, the sample of subsoil may be taken with less exactness, perhaps at some ditch or other accessible point, and its physical characteristics noted, i. e., whether a clay, rock, sand, etc.

Combine the borings of a given depth. Empty these large composite samples in turn upon canvas, oilcloth blanket, large heavy paper, or floor so as to protect the sample as much as possible. Break all lumps and mix thoroughly. Divide the sample by "quartering" and discard the two diagonally opposite quarters; mix the remainder and again quarter, repeat the process until only about $1\frac{1}{2}$ to 2 kilograms are left, and place in cans or in tight canvas or muslin sacks for the laboratory.

Each sample should have duplicate labels, one to be placed inside the bag and the other to be tied on the outside. A number may be marked on the bag and a descriptive letter prepared, but the label to be placed within the bag should, under no circumstances, be omitted. This process of taking samples may be modified as the exigencies of the work necessitate, but only those taken as above will be entirely satisfactory. Any departure from this method of sampling should be carefully noted.

Describe accurately the location of the field from which the sample is taken and the actual depth represented by each sample. It is often desirable to relocate a field and repeat the analyses after the fields are under irrigation or have been cropped for a long time. Add any statistics regarding the land as to crops, years under cultivation or since cultivation, etc., or any topographical information which is easily available.

ORANGE GROWING IN BATANGAS.

It has been estimated that the crop of oranges which is just being finished in the immediate vicinity of Tanauan, Batangas Province, has amounted to about ₱80,000 (f. o. b. value). The bulk (probably 85 per cent) of this crop is of the "naranjita" or seedling mandarin type. This is by far the largest crop ever exported from this vicinity, though it is possible as large crops have been *grown* previously; transportation by pack horses had always proved inadequate; the railway now solves the difficulty.

When we remember that this very valuable crop is produced on trees which receive no horticultural attention whatever as to pruning, careful cultivation, fertilizing, grafting, or protection from disease and insect enemies, the fact stands out as a most remarkable case of the planter *occasionally succeeding in spite of himself*.

There are probably a quarter of a million orange trees of bearing age in the so-called Lipa district.

It is interesting to note that in a very few cases the planters have just recently begun to plant secondary crops—peanuts, sweet potatoes, beans, etc.—between the rows of the young trees.

BANANA DISEASES.

The principal districts of Central America are now suffering very severely from the so-called Central American, or Costa Rican, banana disease. It is probably already in existence throughout the West Indies, and was discovered in September last in Hawaii by Mr. O. W. Barrett, of this Bureau. Should this disease gain entrance into the Philippine Islands it might reduce the quantity of bananas and plantains produced here by 75 per cent.

An apparently new disease has recently broken out in Bataan Province where it is destroying practically all of the plants in some centers. Unlike the Central American disease which begins near the heart of the plant and spreads centrifugally, the Bataan disease begins on the surface of the stem and spreads inward; the former is probably bacterial in origin, while the latter is due to the mycelium of a fungus.

Laws regulating the inspection of imported plant material should be put into force in the Philippines at once, for banana diseases are of but little account compared to some other plagues which are liable to be introduced here at any time, unless measures are taken for this prevention. It should be remembered, however, that the abacá industry would be threatened very gravely should any fungus or bacterial disease be allowed to spread among the bananas of the Philippines.

SOIL INOCULATION.

The Bureau of Agriculture has begun a coöperative experiment with the Bureau of Health along the line of soil inoculation for beans, peas, etc., that are now being grown in the vacant-lot school gardens in this city. The idea of establishing school gardens in vacant lots in different parts of the city originated with Dr. A. C. Garton, of the Bureau of Health, who is desirous of inducing the Filipinos to grow a variety of legumes for the purpose of supplying the almost utter lack of proteids in their present diet.

The experiment was initiated in a garden on Calle Nueva, Malate, and will probably be extended to two or three other gardens in other parts of the city. Check plots will be left in all cases to demonstrate the utility, if any, of this method.

The soil for these experiments was obtained from about the roots of old bean vines at the Singalong experiment station.

NOTES ON THE BAGUIO EXPERIMENT STATION.

Strawberries are doing excellently. A comparatively large amount of commercial fertilizer and lime has been used on them. There appear to be no fungus diseases nor insect pests.

The cruciferous vegetables are beginning to be badly infested with the cabbage butterfly. The experiment of reducing the number of the mature insects by netting was begun and apparently will prove practicable.

Tomatoes are badly affected with a fungus leaf disease. No traces of the black stem rot ("bacterial blight") have been noted. The second planting will probably prove more or less a failure this season.

On account of the recent dry weather all the beans are practically free from fungus diseases with the exception of the broad bean.

The peas at this station are in excellent condition.

NOTES FROM OTHER FIELDS.

EXPERIMENTS IN MANGO PROPAGATION.

Some interesting and important data with regard to shield-budding the mango are published in the Porto Rico Horticultural News for October (Vol. III, No. 10). Mr. P. J. Wester, who gives an account of the success achieved by Mr. Orange Pound, considers that his discovery marks an epoch in the mango industry. Mr. Pound, by his method, obtained over 85 per cent of healthy trees among a lot of 300 plants budded. We quote the following from Mr. Wester's account of the process.

Success depends on the prime condition of the stock plant and that the sap is flowing freely; the buds should be selected from well-matured wood that is still green and smooth, of the first, second, and third flushes from the terminal bud, and cut rather large, 3 to 5 centimeters long (1½ to nearly 2 inches). The lower, thick part of the leaf stem at the bud should not be trimmed off but allowed to remain on the bud until it is shed voluntarily. If the leaf stem, or petiole as it is also called, is cut too near the bud, fungi frequently gain entrance through the wound and destroy the bud. It is possible that the leaves can to advantage be trimmed off the bud-wood while it still remains on the tree and the bud-wood be used after the petioles have dropped and the leaf scars are well healed. It appears to be equally satisfactory to push the buds up or downward. To facilitate the insertion of the bud, it is well to trim off the edge of the horizontal cut. In tying the bud, allow the remnant of the petiole to stick out between the strands of the tape and protect it and the bud from the sun and rain with a square piece of wax cloth held in place by one of the strands of the tape above the bud. It is essential that the buds should be inserted at a point in the stock where the bark is of about the same age as the bud-wood, i. e., green and smooth, and the work done when the plant is in flush. When the union has been effected, which will be in the course of two or three weeks, the stock should be pruned off about 6 inches above the bud. The buds are sometimes very dilatory about starting, and in order to force them out the plants should, after the buds have taken, frequently be gone over and all adventive buds rubbed off.

In top-working old seedling trees the same principle obtains. Part of the main branches are then pruned off to 1 to 2 feet from the trunk and the resulting sprouts are budded and treated in the manner already described. As the buds increase in size the native top is gradually removed; care should be taken, however, not to prune the tree too severely at one time, as it is then apt to become permanently injured and die from such treatment.

TAPPING CASTILLOA RUBBER.

The Journal of the Jamaica Agricultural Society for October (Vol. XIV, No. 10) contains an article by Mr. L. A. Wates giving some conclusions he has reached in the course of tapping *Castilloa* rubber trees in Portland. It is stated that experiments were made on 37 trees varying in age from 8 to 14 years, and in girth from 20 to 65 inches, with the soil poor and unsuited to rubber cultivation. One of the trees, about 15 years old, growing on a stony, red, hot soil, gave 25½ ounces of rubber at the first tapping. Mr. Wates accounts for this in two ways: First, the tree always had its trunk shaded by shorter trees, causing the bark to grow thicker, and thus giving a larger surface of latex-bearing tissue; second, at some time in its young growth the tree was topped, causing it to fork, giving larger girth near the ground and available for tapping. In each case the forked trees gave best results, leading him to the conclusion that topping trees at 12 feet is advisable.

The tree yielding 25½ ounces at first tapping ceased to give latex at the end of three months, after being tapped at regular intervals of thirty days. After a rest of four months the tree yielded 7 ounces, and up to date the tree had yielded 41 ounces. In connection with his other experiments Mr. Wates concludes that a tree on moderate soil at 8 or 10 years of age should be at least 40 to 45 inches in girth, and yield 4 or 5 ounces of rubber at the first tapping. But frequent tappings of *Castilloa* by methods used for *Hevea* are useless, and it is the opinion of the writer that trees should be tapped either three or four times a year at equal intervals, and that growth and girth rather than age should determine the time for tapping unless conditions were equal and the age well established.

Methods of tapping and some of the difficulties to be overcome are discussed at some length. In conclusion, Mr. Wates says that taking into consideration the fact that these experiments were made on rubber trees growing in dry, marly, red dirt, in many cases on hilltops, or in open pastures, he is still of the opinion that *Castilloa* rubber growing may be a profitable enterprise.

BANANA CULTIVATION IN JAMAICA.

With regard to banana cultivation in Jamaica, Mr. H. Q. Levy, an agricultural instructor, makes the following statements in the Journal of the Jamaica Agricultural Society (Vol. XIV, No. 10):

This is the month (October) when all bananas should be suckered, and the suckering should be of a different kind to that done at any other time

of the year. It is now the time to make your final choice of suckers for the spring of 1912. The "peepers," i. e., suckers about 4 to 6 inches high that were left in July on first and second ratoons, should have grown to about 2 feet 6 inches to 3 feet high. All but one on each parent plant must be taken out. If bananas are planted 14 by 14, two may be left to each stool, if 12 by 12, each alternate stool should have two and the intermediate one a single sucker; distances closer than this, each stool should only be allowed one sucker. It is quite a mistake to crowd your field with suckers so as to get a large number of bunches; it is better to go on the selective principle, giving each root plenty of light and air, for it is only by so doing that there is any likelihood of the planter being able to bring in a spring crop after cutting the first or plant crop. In "plants," if the suckers are *well advanced*, or *fully grown*, which they should be by the second week of October, "peepers" ought now to be left, one to each sucker; if they happen to be backward, then taller suckers must be left. Old bananas and those that are thick and heavily shaded, should have sword suckers fully 5 to 6 feet high now. In all suckering, be careful not to have your 1912 "followers" on old stumps, or suckers, the fruit which will soon be cut. Such followers will only develop into "water suckers." Be also careful not to injure more roots than is absolutely necessary. Round-pointed cutlasses ought never to be used for suckering; they destroy too many of the main roots, and can not, in heavy soils, be pushed down far enough to kill the heart eye.

He goes on to say that October is not a good month for planting new fields of bananas. Those who live in the hills should plant later than those on the plains, for the atmosphere and earth remain cold longer. Consequently "bananas planted in October grow to a height of a foot or two and remain at that until February or March before making a fresh start, whereas those planted in February or March start right away, and never having had their growth checked or stunted, make far healthier suckers, and will be found to come in just as early, if not earlier than those planted in October."

SUGAR MATTERS IN FORMOSA.

The Yokohama Chamber of Commerce Journal, quoted in the Federal Reporter (Vol. XI, No. 10), gives an interesting account of the success attending the development of the sugar industry in Formosa. It is believed to have superseded all other industries not only in that Island but in all Japan, and many sugar companies are netting large profits. According to a late report, it is estimated that the production for the season will be 3,000,000 piculs, including 1,800,000 piculs of refined sugar and 1,200,000 piculs of red sugar.

The production of two large sugar companies estimated at 700,000 and 80,000 piculs, respectively, has increased to 770,000 piculs of the former and 100,000 piculs of the latter, the increase being considered due to the abundance of raw materials.

SUGAR FROM DRIED CANE.

A startling feature in sugar manufacture has recently attracted the attention of experts in Cuba and the United States. It seems that it has been found possible to crush and dry sugar cane so that it can be baled and shipped long distances without serious loss from fermentation. The advantage of this method, if it can be economically used, will be the extraction of a considerably greater amount of the sugar by the so-called "diffusion" process. However, it remains to be seen whether the increase in sugar from this method, and the advantage of cheap fuel such as natural gas, coal, etc., would offset the expense of long-distance transportation and the cost of drying.

We learn that 4,127 bales of dried cane were recently shipped from Cuba to Madison, Wisconsin, via Mobile, Alabama, with the object of testing this apparently impracticable method.

MARKET REPORTS.

MANILA HEMP RECEIPTS AND SHIPMENTS.

Telegram from Manila to London, December 26, 1910.

Receipts and shipments.	1910	1909
Hemp receipts at Manila since January 1	1, 016, 845	934, 294
Hemp receipts at Cebu, etc	301, 139	327, 651
Hemp receipts at all ports since January 1	1, 317, 984	1, 261, 945
Shipments to United Kingdom by steamer, cleared since January 1	529, 637	403, 781
Shipments to Atlantic coast, United States, by steamer, cleared since January 1	467, 369	599, 881
Shipments to Pacific coast, United States, by steamer, cleared since January 1	105, 555	121, 321
Shipments to continental ports, by steamer, cleared since January 1	88, 252	61, 546
Shipments to all other ports	60, 359	
Local consumption since January 1	11, 000	
	71, 359	54, 622
Loading steamer on the berth for the United Kingdom, about	37, 000	8, 000
Loading steamer on the berth for Atlantic coast, United States, about	28, 000	30, 000
Shipments per sailer to Atlantic coast, United States, since January 1	20, 650	21, 730

Bales of hemp loading for United Kingdom, by steamers :

Erroll	22,000
Kilchatten	14,000
Fernando Poo	1,000

Total

Bales of hemp loading for United States, by steamer :

Suruga	28,000
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Total

TEMPERATURE AND RAINFALL FOR AGRICULTURAL DISTRICTS IN THE PHILIPPINES.

By the DIRECTOR OF THE WEATHER BUREAU.

DECEMBER, 1910.

[Temperature and total rainfall for twenty-four hours beginning at 6 a. m. each day.]

Date.	Hemp.				Sugar, Iloilo.		Rice, Tarlac.		Tobacco.			
	Albay.		Tacloban.		Temperature.	Rainfall.	Temperature.	Rainfall.	Aparri.		San Fer- nando.	
	Temperature.	Rainfall.	Temperature.	Rainfall.					Temperature.	Rainfall.	Temperature.	Rainfall.
	°C.	mm.	°C.	mm.	°C.	mm.	°C.	mm.	°C.	mm.	°C.	mm.
1	26.3	16.3	26.7	---	26	27	25.6	---	24.8	---	24.8	---
2	26.6	39.5	26.2	69.4	26.8	21.8	26.2	---	26	7.6	26.2	---
3	25.3	44.3	25.4	42.3	25.4	24.9	25.6	7.6	24.9	5.1	25.7	5.1
4	26.9	59	26.2	5.3	27.2	---	26.9	---	23.5	12.9	26.6	---
5	27.1	14	27	2.8	27.4	1.8	27.2	---	23.6	4.3	26.1	---
6	26.8	---	25.6	8.2	26.6	---	27	---	25.3	---	26.1	---
7	27	9.1	25.1	10.6	25.7	27.2	27.4	---	24.8	---	25.8	---
8	26.6	5.6	25	3.8	25.9	---	26.8	---	24.8	---	25.8	---
9	26.2	42.2	25.5	21.4	25.7	1.6	26.9	---	24	2.8	26	---
10	25.9	6.8	26	10.6	27.1	---	26.4	---	23.8	5.6	24.8	---
11	26.7	3.3	25.3	4.3	26.7	1.8	26.5	---	23.6	13.7	25.7	---
12	26.8	23.1	25.4	17.1	26.1	9.9	26.5	1.8	24.3	75.6	25	---
13	27	6.6	25.5	8.1	26.8	---	26.5	---	24.6	54.6	26.3	---
14	26.8	14.5	26.3	6.6	26.7	---	28.2	---	23.5	38.8	26.6	---
15	25.5	36.6	25.4	5.4	26.1	.3	28	---	22.8	31.4	26.8	---
16	26.6	61.2	25.7	1.8	26.5	---	26.6	---	22.6	2.3	26.6	---
17	25.4	21.4	25	15.8	26.1	.5	27.8	---	23	---	25.9	---
18	25.9	---	25.3	.5	25.6	---	24.8	---	22	---	24.5	---
19	26.2	.5	25.4	2.3	26	---	25.1	---	22.4	---	24.6	---
20	26	.5	25	---	25.3	---	25.1	---	22.7	---	24.2	---
21	25.1	41.1	25.3	13.5	25.6	.8	25.4	---	22.6	.6	24.1	---
22	24.9	4.3	24.7	65	25.4	.5	25.9	---	22.7	7.3	25	---
23	25.8	43	26.1	17.9	25.9	35.9	25.7	---	23	1.6	25.7	---
24	24.9	47	27.1	---	25.9	15.3	25.2	---	23.2	---	25.4	---
25	25.4	16.1	26.8	---	26.6	.3	25.5	---	23	---	25	---
26	26	20.6	26.8	1.8	27.3	1.3	26	---	23	.3	25	---
27	26.4	34	26.4	2.1	26.7	.3	26.9	1.8	23.5	2.5	25.7	---
28	24.6	34.2	27	4.1	26.6	.3	24.6	---	23.4	---	26.4	---
29	25	2.3	25.6	50.8	25.5	6.3	25.6	---	22.5	2	25.3	---
30	25.4	.5	24.2	24.2	24.8	---	25.4	---	23.3	---	25.5	---
31	25.2	3.6	25.5	---	25.4	1.1	25.7	---	23.1	---	25.2	---

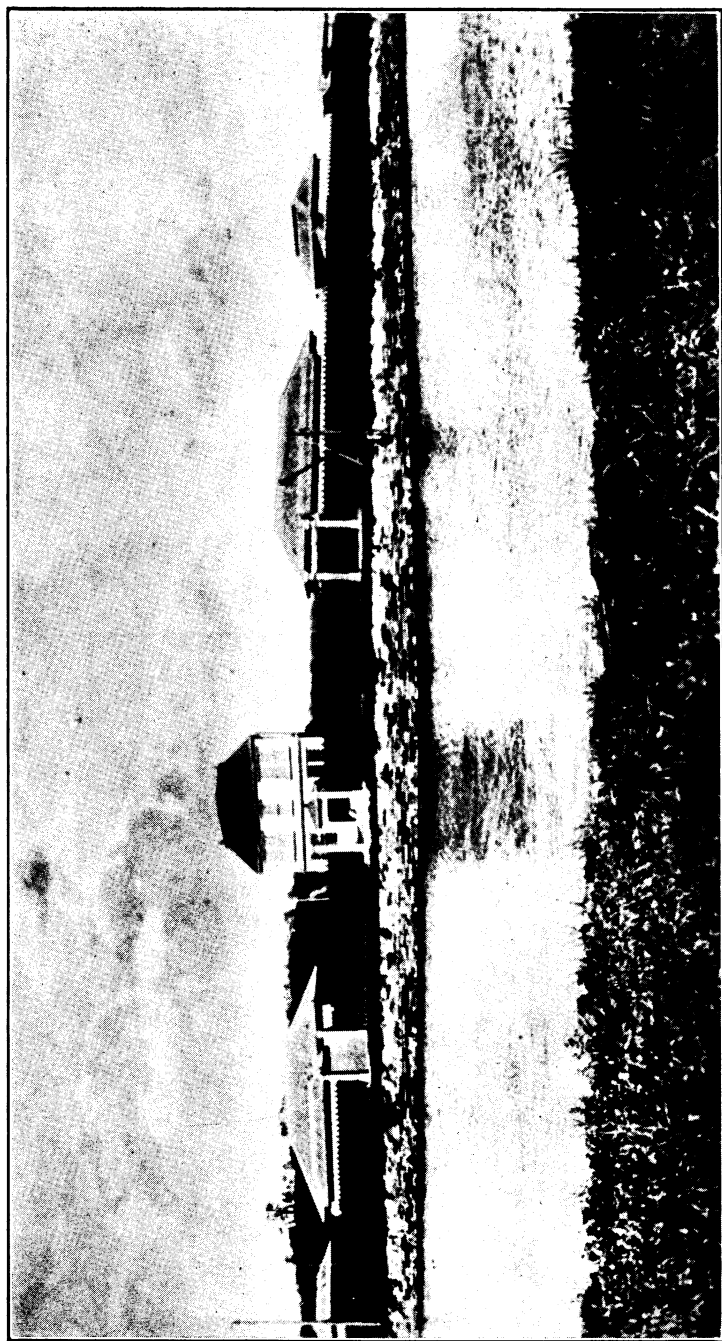


PLATE I.—QUARANTINE STATION USED FOR THE DETENTION OF IMPORTED ANIMALS AT YOKOHAMA.

THE PHILIPPINE *Agricultural Review*

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EDITORIAL.

VETERINARY WORK IN JAPAN.

During the month of November, 1910, the assistant chief veterinarian and the superintendent of the serum laboratory of the Bureau of Agriculture made a brief investigation of the veterinary institutions of the Japanese Government. This investigation was greatly facilitated by the very courteous assistance of both Japanese and American officials. A summary of the report covering this investigation is published in this number of the REVIEW under the title, "Brief Report on the Veterinary Institutions of Japan."

That the Japanese fully realize the importance of the live-stock industry of their country is shown by the enactment of wise legislative measures to protect this industry, and the establishment of modern and well-equipped veterinary colleges, laboratories, quarantine stations, and slaughterhouses. The stringent measures that have been used in eradicating rinderpest, and the effective manner in which this work has been accomplished by the Japanese are matters of vital interest to anyone who raises or handles live stock in the Philippines.

It is apparent that *thoroughness* is the keynote of all veterinary work in Japan. Every effort is made to work out sound theories, and when such theories are clearly established to put them into actual practice. As a result of this policy and of these methods, Japan has not suffered any serious losses from animal diseases during recent years.

OUR PROVINCIAL FAIRS.

The holding of provincial fairs in the leading provinces of these Islands marks the beginning of a movement amongst the people which if successfully carried on will be more significant and far-reaching in what it accomplishes for harmony, unity of ideas and sentiment on our fundamental problems of progress, amongst all classes of Philippine Society, than any other popular movement of a similar character since the organization of our present Government. This movement is the natural sequence of the educational and other work which has been carried on for the past ten years. The results of the half dozen or more provincial fairs which have been held in the leading agricultural districts of the country have been, doubtless, more far-reaching than can at present be realized.

Unity, coöperation, and confidence are perhaps the three most important words in our present Philippine problem. Without

these, as the warp and woof of our everyday life, the highest social, industrial, and commercial achievements—the greatest progress is impossible. The Filipino people have shown no lack in their social inclinations which have been marked by their love for *fiestas* and social gatherings. To-day we need societies and gatherings of all classes which have for their purpose some specific improvement of present social conditions, which will make all classes realize their common interests and their common dependence upon one another. Public sentiment, a common sentiment on the part of all classes of people, is necessary for the greatest progress and the greatest achievements.

The provincial fairs brought together hundreds of thousands of people of different languages and from different sections, but with a common interest in friendly contests and competitions, the benefit of which can not be overestimated. This was most strikingly illustrated in the Moro Province. The Moro Province Fair spoke volumes, not only for peace, but for the progress and prosperity of the people.

The educational value of these fairs has been demonstrated in many ways. They not only bring the farmers, merchants, and manufacturers together with the best products of their farms, shops and factories but they make them realize more fully their common interests; they reveal the resources available at their very doors and point out possibilities for the better development of these resources.

In 1909 the United States Department of Agriculture made the following announcement at the State fairs in the great corn belt of the United States: "Splendid as is our present corn yield, the corn crop of the United States can be increased in value by one hundred million dollars through a wise and careful selection of seed; it can be increased another hundred million by a better process of drying and sorting the seed selected; it can be increased another hundred million by a better care of the growing plant, and still another hundred million by a better care of the soil." Think of the significance of such a statement if the farmers were prepared and ready to act upon it.

The great masses of the people in the Philippines know very little and understand much less of the real significance and importance of the work being done by the Insular and provincial governments. In a previous editorial we called attention to the educational value and the importance of the exhibits of the Bureaus of Printing, Navigation, Internal Revenue, Public Works, Science, Forestry, and Agriculture, at the 1910 Carnival.

In the last report of the Director of Education we find this statement: *"It is perhaps not going too far to venture the assertion at this time that, within two or three years from this date, no State or national government will have in practical operation a system of industrial instruction more consistent than that of the Philippines in its sequence through the various grades, or more closely adapted to the material conditions and requirements of the country."* In the same report the Director states that the Bureau of Education with its 10,000 employees in daily touch with almost half a million children, in nearly 5,000 schools, stands ready to assist in every way possible all governmental organizations—the Bureau of Health in instructing the people relative to sanitary measures and as to precautions against the spread of epidemics; the Bureau of Agriculture in advising the people as to the proper methods of soil cultivation, the varieties of plants specially adapted to the Philippines, and the circulation of information of agricultural interest. It is clearly our duty to assist the Filipino people in developing the resources which are available on every hand, but with such work by the schools, it is, furthermore, clear that there will soon be a demand on the part of the coming generation of Filipinos for us to guide them in the industrial and commercial development of their country. We can not doubt that these exhibits of work done in different towns and provinces will result not only in many of these industries being introduced into other towns where the natural resources are available, but in their improvement.

The friendly competition in the contests and exhibits at these fairs appeals to the pride which everyone has in his own ability and the work of his own hands. Fairs are, in a sense, a taking of stock, a popular industrial and commercial invoice of the natural resources of a section or district and of the actual progress and ability of the people in developing these resources for their highest uses, which points out the possibilities for future development and progress.

GENERAL ORDER NO. 19, BUREAU OF AGRICULTURE.
THE DISINFECTION OF BOATS AND
RAILWAY CARS.

By the DIRECTOR OF AGRICULTURE.

MANILA, P. I., *January 4, 1911.*

Notice is hereby given that the provisions of General Order No. 17, issued by the Bureau of Agriculture on November 8, 1910, are rescinded and superseded by the following:

1. Owners of railway cars and steamboats or other water craft are required to thoroughly clean and disinfect the same immediately after the discharge of each shipment of cattle, carabaos, sheep, goats, or swine. This cleaning and disinfecting shall be performed by the owners of the boats or railway cars or their agents, and in the ports of Manila, Iloilo, and Cebu it shall be carried out in the presence of the representative of the Director of Agriculture. At all places, except Manila, Iloilo, and Cebu, the cleaning and disinfecting shall be performed in the following manner:

(a) Remove all litter and manure which shall be burned, buried at least one meter below the surface of the ground, discharged at sea at least one mile from shore, or disinfected by thoroughly saturating it with a 5 per cent solution of carbolic acid, Jeyes' fluid, or some other reliable disinfectant approved by the Director of Agriculture.

(b) After they have been thoroughly cleaned, drench the sides and floors of railway cars and all parts of boats contaminated by cattle, with a 5 per cent solution of one of the above-mentioned disinfectants.

2. At the ports of Manila, Iloilo, and Cebu, all boats, railway cars, etc., shall be disinfected by the owners in the presence of a representative of the Director of Agriculture immediately upon the discharge of any of the above-mentioned animals, and such disinfection shall be performed in whatever manner the representative of the Director of Agriculture, at the port where

the animals are discharged, may deem necessary in order to prevent the spread of contagious animal diseases.

3. The provisions of this general order shall become effective on January 15, 1911.

G. E. NESOM,
Director of Agriculture.

Approved:

NEWTON W. GILBERT,
Secretary of Public Instruction.

BRIEF REPORT ON THE VETERINARY INSTITUTIONS OF JAPAN.

By R. F. KNIGHT, *Assistant Chief Veterinarian,*

AND

C. G. THOMSON, *Superintendent of the Serum Laboratory.*

ORGANIZATION.

The veterinary corps forms one of the divisions of the bureau of agriculture, which is under the administration of the minister of agriculture and commerce, and to it are assigned the inspection of meat, the inspection and quarantine of imported animals, and the control of contagious and infectious animal diseases. Although the improvement of equines is left entirely in the hands of the military department, the remainder of the animal husbandry work comes within the field of the bureau of agriculture, and so much has been done along this line by the importation of foreign stock that in some localities it is difficult to find an animal of pure Japanese blood. Numerous publications pertaining to the veterinary work and organization have been issued in the form of pamphlets and compilations.

RINDERPEST ERADICATION.

The work of the eradication of rinderpest in Japan by the bureau of agriculture is greatly facilitated by existing provisions, not only for the slaughter of animals affected with this disease, but also for those suspected of being infected. Quarantines are maintained against the districts where disease prevails by an efficient police force in such a manner that there is little danger of the extension of the area infected. As a matter of fact, however, the Japanese people have such a hearty respect for law and order that there are few attempts to violate any quarantine regulations that are imposed.

In addition to the slaughter of the animals affected and those directly exposed, and strict quarantine over the infected locality, the injection of antirinderpest serum is practiced upon the neighboring animals which are not known to have been directly

exposed to the disease. The Japanese officials believe that antirinderpest serum is valuable in stamping out an epizootic of rinderpest and that in the majority of cases a dose of 100 cubic centimeters can be depended upon to confer a passive immunity to the average animal for a period of two or three weeks. It appears that their conclusions regarding the value of antirinderpest serum have been drawn principally from literature. They use serum largely on those individuals which they believe are not exposed and where they do not expect the disease to appear. The fact that they do not have a large number of cases among animals that have been injected with antirinderpest serum seems to be due to the fact that very few of the injected animals are actually exposed. Their tests regarding the efficiency of this serum have been, so far as could be ascertained, the simultaneous injection of serum and virulent blood. It is believed that the simultaneous injection of large doses of serum will greatly reduce the percentage of mortality in animals that are given virulent blood, but this does not prove that the injection of antirinderpest serum will prevent an attack when an animal is exposed several days after the injection of serum. However, some of the Japanese, especially Dr. H. Tokishige, superintendent of the Institute for the Infectious Diseases of Animals, believe the injection of antirinderpest serum to be of little value except when used in connection with other measures, such as the slaughter of infected individuals and those directly exposed, strict quarantine of the infected district, etc.

During the past few years outbreaks of rinderpest in Japan have been largely due to the importation of disease from China and Korea. On several occasions they have suffered from small outbreaks which have been traced to these sources but these outbreaks have been speedily suppressed by stringent measures, and the country has remained free from rinderpest until another importation of the infection. Japan suffered its heaviest losses from rinderpest in 1896, for which year about 7,000 deaths are recorded. This infection was stamped out during the same year and no new cases appeared until 1899. Since then the disease has appeared from time to time through importations received from the mainland, but it has never seriously menaced the livestock industry. At the present time Japan is entirely free from rinderpest, and to prevent the importation of contagious and infectious animal diseases the Government has installed quarantine stations at the principal ports and has issued stringent regulations governing the inspection and quarantine of animals received from foreign countries.

QUARANTINE STATIONS.

One of the quarantine stations, that at Yokohama, was visited. It is small, accommodating only about 50 animals, but as practically no animals except those for breeding purposes are imported at Yokohama, it is of sufficient size for that port. The quarantine station is located about 5 miles from the central part of the city and is situated on a small inlet so that live stock can be transported directly from the steamers to the place of quarantine.

The entire station occupies about three-tenths of a hectare of ground and is surrounded by a tight board fence about 3 meters in height. In the center of this area is a building of two stories, which is used by the quarantine officials as an office. Around this central structure are several other buildings used for the detention of animals. These buildings are constructed along sanitary lines, having concrete floors and electric lights. They are well ventilated and offer ample room and comfortable accommodation to the animals. Some of these buildings, those used for the detention of animals which may have been exposed to any of the diseases which are most commonly transmitted by flies, are provided with double screen doors and windows. In addition to these structures there is a small building located in one corner of the grounds for the isolation of suspected cases of disease, and another similar building which is used exclusively for post-mortem work. Bovines and other animals susceptible to rinderpest, imported from foreign countries where rinderpest is known to exist, are held at this quarantine station for twenty days after their arrival. In case rinderpest develops among any of the imported animals during the period of quarantine the entire herd is slaughtered and without indemnity to the owner. These regulations do not apply, however, to cattle imported for slaughter, as these are held in quarantine for two weeks only, after which time they are required to be slaughtered within three days.

SLAUGHTERHOUSES AND MEAT INSPECTION.

The cattle dealers and butchers are required to furnish men for slaughtering their animals and they are charged a moderate sum for the use of the abattoir (for cattle and horses, 1 yen¹ per head, and for hogs, 25 sen). The buildings connected with the Government abattoir at Tokyo cover about one-fifth of a hectare of ground which is inclosed by a board fence. On two sides of this inclosure are sheds for tying animals which are

¹ 1 yen = ¥1; 25 sen = 25 centavos.

awaiting entrance to the slaughterhouse. The hours for slaughtering are from 5 a. m. to 10 a. m. There is daily inspection before the killing commences of the clothing worn by the men working at the slaughterhouse and of all baskets and other utensils.

The Government inspection of meat consists of a careful ante-mortem inspection of the animals and a thorough post-mortem examination of the carcass. The ante-mortem inspection is conducted in a shed which is near the entrance of the main building and equipped with scales for weighing the animals. Near this shed is a building used as an office for the veterinarians and police officers in charge, and at one end of this latter structure is a laboratory sufficiently equipped to enable the veterinarians to make a microscopical examination of the abnormal tissues revealed by the post-mortem examination. This laboratory is supplied with glass jars and preservatives for the collection of interesting pathological specimens which are occasionally encountered.

The main structure where the butchering is performed, has a concrete floor with deep grooves running in two directions so that the fluids are carried into the main gutters without spreading over a large area of the floor. The walls to the height of $1\frac{1}{2}$ meters are enamelled tile. About one-third of this building is partitioned off for the dressing of cattle. These are skinned on the floor, and then by means of men and tackles, are hoisted to a track where they are eviscerated. A post-mortem examination is made in this room, and if no pathological lesions are found, the carcass is stamped and passed for food. If any abnormalities are revealed, the carcass is run into a separate room for a final examination and the viscera are carried into another room where they are placed upon a table and given a thorough examination in order to ascertain whether or not the carcass or any of its parts are fit for human consumption. A room adjacent to the main killing floor is devoted entirely to the cleaning of viscera. Hogs are slaughtered on the opposite side of this building and go through the same system of inspection as the cattle. Horses and other animals are occasionally slaughtered, but cattle and hogs form the principal means of supply. Condemned carcasses are taken from the slaughterhouse to the crematory, while condemned parts, such as lungs, livers, etc., are rendered sterile by boiling at the slaughterhouse and then used for fertilizer.

The Government slaughterhouses are under the supervision of the police department, and the stamps with which the quarters are marked bear the words "Inspected by the chief of the police

court." The bureau of agriculture inspects the meat and decides whether or not it is fit for human consumption. The remainder of the work at the abattoir is under the supervision of the police department.

The inspection of meat is very thorough, and all meat imported into the Philippine Islands bearing the stamp of the Japanese Government may be considered fit for human food unless affected by decomposition or other changes which have taken place after the inspection. At the Government abattoirs in Japan, a great many parts are condemned on account of the presence of animal parasites. Among those more frequently found are the *Echinococcus*, the *Strongylus Paradoxus*, and the *Distoma hepaticum*. The first of these often produces in the lungs a marbled appearance, which on microscopical examination somewhat resembles a lung affected by contagious pleuro-pneumonia. The last of the three mentioned is very common, and when this parasite is found the entire liver is condemned. Aside from the parasitic affections, tuberculosis is one of the diseases most frequently discovered. This disease is quite widespread in Japan, and the Government has taken important steps toward its control.

INSTITUTE FOR THE INFECTIOUS DISEASES OF ANIMALS.

In connection with the control and eradication of animal diseases, the bureau of agriculture maintains at Tokyo, under the direction of Dr. H. Tokishige, a laboratory well equipped for experimental work and the production of serums and vaccines. The scope of its work is indicated by the following table showing the quantities of various preparations produced there during the year 1909:

Antirinderpest serum	liters....	400
Anthrax serum	do.....	151
Anthrax vaccine	do.....	5
Tuberculin	do.....	33
Mallein	cubic centimeters....	725
Chicken cholera vaccine	liters.....	40
Swine erysipelas serum	do.....	2.5
Antistreptococci serum	do.....	29

The preparation of serum for hog cholera and blackleg is being commenced, but up to the present time very little has been produced.

All the animals at the institute are inclosed in the same yard, so that great precautions are necessary to prevent the spread of the different diseases from one stable to another. For this reason animals are kept in fly-proof sheds which are so constructed as to readily permit a thorough disinfection. The

unnecessary passage of attendants from one building to another is prohibited, and all persons entering any part of the grounds, except the laboratory proper, are required to wear rubber boots which are immersed in antiseptic baths upon leaving any of the buildings. The institute covers about one hectare of ground and is inclosed by a high fence. About 35 animals are used in the production of antirinderpest serum besides a few others which were being held as virus carriers.

The general method of the production of antirinderpest serum is very similar to that which is being practiced in the Philippine Islands, but the process of immunization is a trifle slower. The animals are bled twice during a period of three days about two weeks after the inoculation of 700 or 800 cubic centimeters of virulent blood. No rules are laid down as to the number of bleedings which each animal is to undergo, but the treatment of individuals depends greatly upon the need for serum, the amount of virus available and other factors. As a rule animals are discharged after the second bleeding following inoculation of 3,000 cubic centimeters of virulent blood. The men in charge of this work claim that larger doses of virus do not give a corresponding reaction, but tend to be destroyed rather than absorbed. They maintain that the serum animals may be used for the production of serum indefinitely without any reduction in the potency of the serum produced. After being placed in stocks the animals are bled from the jugular vein by means of a trocar and canula, the blood being received into a cylindrical glass jar about 10 or 12 centimeters in height and of a capacity of about 400 cubic centimeters. After the blood is drawn these jars are covered by means of glass plates. They claim that a much better separation of bovine serum is obtained by the use of this type of jar than with tall cylindrical ones of a smaller diameter. After the separation of the serum from the solid parts of the blood, it is drawn from the jars by means of a pipette, and without filtration is sealed for delivery in brown glass bottles of 100 cubic centimeters capacity. It is said that abscess formation seldom follows the injection of this unfiltered serum.

They think that the strength of the individual has much to do with the efficiency of the serum, produced, and on this account they use only strong robust bulls as serum animals. Those which give a medium reaction to the inoculation of virulent blood are considered better for the production of serum than those which experienced a very strong or very weak reaction, as those giving a very strong reaction are believed to be weak

individuals. Before a serum animal is put into constant use as such his serum is tested on a calf and must protect the calf in doses of 110 cubic centimeters per 100 kilos against the simultaneous inoculation of virulent blood.

VETERINARY INSTRUCTION.

Besides maintaining quarantine stations and slaughterhouses, and laboratories for the preparation of sera and vaccines, the Japanese Government has gone still further and has established a veterinary course to prepare men for recommending and carrying out the sanitary principles for the preservation of live stock. The course is given in the Imperial University at Tokyo, and for entrance the completion of a course in one of the "higher schools" is required. The period of instruction covers three years of ten months each, and includes the principal subjects pertaining to veterinary and sanitary science.

The main building used by this course is occupied by class rooms, laboratories, and museums. The museums are especially well equipped, containing numerous specimens and models. The anatomical section contains skeletons of all domestic animals, models of the organs of special sense and viscera, and paper models of the head and limbs, showing the relative positions of muscles, nerves, bursæ, ligaments, and blood vessels. These models have been prepared by the professor of anatomy by means of plaster of Paris casts of dissected specimens, and are as natural and accurate as models could be made. In relation to horseshoeing, there are specimens and drawings illustrating the positions occupied by the bones in various attitudes of the horse. Horseshoes from various parts of the world are exhibited as well as shoes for correcting all abnormalities. Another section contains animal foodstuffs, both foreign and Japanese, and specimens of nearly all the medicinal plants. Models of horse stables and dairy barns, as well as models of the different breeds of stock, are used for instruction in animal industry. Besides the models and specimens already mentioned, the museum contains a large supply of pathological specimens which have been collected by the faculty.

At the rear of the main structure are three buildings used for hospital purposes. One of these provides stable room for about twenty large animals. Another is used as a small animal house, and contains accommodations for about forty cats or dogs. Both of these buildings contain consultation and operating rooms and are fully equipped with instruments and apparatus for clinical work. Horses are shod and clipped at the hospital,

the owners being required to pay a small sum for the expense incurred.

As a whole the veterinary course seems to be very thorough and up-to-date in every way, and compares very favorably with the courses given at the veterinary colleges in the United States.

CONCLUSION.

The Japanese have shown a clear understanding of the importance of animal diseases by the establishment of suitable quarantine stations and abattoirs, and of excellent veterinary colleges and laboratories for the study of subjects pertaining to veterinary work and the education of men to protect their live-stock interests. The enactment of wise legislative measures again demonstrates their realization of the importance of live-stock protection as well as a confidence in the men who are making a life study of this work. This realization of the importance of the live-stock industry and the confidence placed in the men capable of its protection, together with the determination of the veterinarians to put into actual practice all sound theories pertaining to the work, have in recent years, prevented animal diseases from causing serious losses. There are many points in the laws, methods, and institutions pertaining to veterinary work in Japan that are worthy the consideration of other countries.

THE PRACTICABILITY OF SUPPLYING NATIVE BEEF TO THE ARMY.

By G. E. NESOM, *Director of Agriculture.*

The December REVIEW contains an article entitled "The Forage Board and Its Work," in which is published an order issued by the honorable the Secretary of War under date of September 1, 1910. It may be noted that this order includes the following paragraph:

The Board will also consider the question of using wholly, or in part, *native* beef for the supply of the Army in the Philippine Islands.

The Forage Board reported on this question under date of January 10, 1911, to the effect that it would be impracticable to obtain a sufficient or satisfactory supply of native beef for the Army in the Philippines at the present time. The report, which goes into considerable detail and considers the question from a number of different points of view would not be of material interest to the general public. It contains, however, a few items of valuable information for both residents and nonresidents of the Philippine Islands.

The Forage Board considered only the *cattle* of the Philippines as available for beef supply as the carabao (water buffalo) is never used for slaughter except occasionally by the Filipinos and Chinese. The carabao meat is very dark and coarse and is not generally considered to be very palatable. Even the native cattle produce a much darker meat than that of the American and European breeds. The native cattle are also much smaller in size than the European types, the average dressed weight running a little under 100 kilos.

The Army is purchasing and using annually in the Philippines about 3,401,925 kilos of beef and 226,795 kilos of mutton, having a total value of about ₱1,350,000. The commissary department estimates that it would take about 32,000 native steers to produce this amount of beef. Statistics recently collected by the Bureau

of Agriculture show that there are in the Philippine Islands a little less than 250,000 head of cattle and nearly 750,000 carabaos, distributed as follows:

Province.	Cattle.	Carabaos.
Agusan.....	311	792
Albay.....	1,284	7,474
Ambos Camarines.....	1,373	12,590
Antique.....	5,571	14,254
Bataan.....	277	5,945
Batangas.....	35,176	12,924
Bohol.....	6,549	27,319
Bulacan.....	1,344	32,488
Cagayan.....	10,626	29,122
Capiz.....	8,115	24,864
Cavite.....	3,110	8,932
Cebu.....	11,107	30,140
Ilocos Norte.....	6,033	29,766
Ilocos Sur.....	13,422	41,470
Iloilo.....	6,198	30,765
Isabela.....	2,358	20,502
La Laguna.....	1,786	12,170
La Uulón.....	4,024	18,935
Leyte.....	6,740	19,814
Mindoro.....	9,953	4,290
Misamis.....	1,287	5,881
Moro.....	16,617	10,434
Mountain.....	15,772	11,707
Nueva Ecija.....	3,051	30,403
Nueva Vizcaya.....	623	4,117
Occidental Negros.....	10,895	33,196
Oriental Negros.....	3,779	12,231
Palawan.....	8,785	4,802
Pampanga.....	1,879	31,363
Pangasinan.....	12,703	72,056
Rizal.....	902	14,562
Samar.....	1,408	7,483
Sorsogón.....	6,049	10,604
Surigao.....	491	8,929
Tarlac.....	1,370	28,851
Tayabas.....	9,051	18,460
Zambales.....	1,869	9,400
City of Manila.....	389	2,158
Total.....	232,277	701,253
Add 5 per cent to cover animals which escaped enumeration.....	11,614	35,062
Grand total.....	243,891	736,315

It is a notable fact that a large percentage of the animals enumerated as cattle are work steers with a correspondingly small number of breeding animals. The constant tendency to use steers for work purposes instead of selling them for slaughter, and the necessity for meeting the local demands throughout the provinces for a beef supply reduces the supply which goes into the regular channels of trade to an almost insignificant number.

Manila is the principal market for native cattle; most of those received are of an inferior class and are slaughtered.

The cattle receipts of this port and the number slaughtered for the past four years are as follows:

Years.	Received from—		Slaugh- tered at Manila matadero.
	Foreign ports.	Philippine ports.	
1906-7	35,649	2,431	24,301
1907-8	37,815	2,820	26,090
1908-9	36,298	2,165	31,180
1909-10	37,547	2,836	25,798

The amounts of cold-stored, cured, and packed meats and meat products imported into the Islands each year are generally in excess of the total value of the meat produced by the cattle slaughtered in Manila. The above facts show clearly that the Philippines are extensive importers of both live stock and meat products, and have no commercial supply to offer for sale in lieu of the present imports either for the Army or for the regular channels of trade. In this connection the attention of the reader is invited to the editorial contained in THE PHILIPPINE AGRICULTURAL REVIEW for January, 1911, which shows the possibilities of the Philippine as a grazing country as soon as the contagious animal diseases now menacing the industry are exterminated.

CULTURAL DIRECTIONS FOR YOUNG PARA RUBBER, EXTENSION WORK CIRCULAR NO. 3.

By O. W. BARRETT, *Superintendent of Experiment Stations.*

Removal from seed bed.—The plants should be taken up only during the rainy season. Unless the soil has been wet with rain the bed must be watered so that the earth will adhere more or less to the roots.

In most cases it will be necessary to cut or break some of the larger roots in removing the seedlings; if many roots are lost in this process it will be necessary to remove some or all of the leaves to prevent evaporation of the sap in the stem before new roots are formed.

The amount of balling which should be done will depend on the character of the soil, the age of the roots, the manner of packing, etc.; generally speaking, the more earth which can be taken up with the plant and packed firmly into a ball around the roots, the less the plant will suffer from the shock.

Whether transported in baskets, tins, or boxes, the seedlings must be protected from drying out and from exposure to the sun.

Seedlings having a height of 1.2 meters or more should be cut back to about 60 or 80 centimeters a few days before removing them from the nursery. The seedlings may be taken up when they have attained a height of 1 meter, and should never be allowed to reach more than 2 meters before transplanting; in special cases trees of 2 or 3 meters could be transplanted in favorable weather by cutting back to about one-half their height before transplanting. Care should be taken to prevent scratching or bruising the bark in handling the seedlings.

Planting.—Setting into the holes should be done after sunset or on rainy days.

The location of the plantation should be such that strong winds can not damage the trees. If there are no adjacent hills or forest trees to break the force of the wind, belts of trees, such as eucalyptus, coconut, bonga, or mango, should be planted around

and through the plantation before or at the time of setting out of the Pará trees. Rows of cacahuete (*Gliricidia maculata*) or ipil (*Lucaena glauca*) may be planted—the former by cuttings, the latter by seeds—as temporary protection, or in conjunction with other kinds, like bonga, coconut, and eucalyptus.

Sandy soils are dangerous on account of the quickness with which they become dry; low wet soils containing stagnant water can not be used, though some wet lands can be drained sufficiently to become safe. Localities which regularly suffer from droughts of more than a few weeks duration should be avoided unless adequate irrigation can be provided. Both alluvial and mountain soils are suitable provided they are always moist.

Holes.—The holes should be prepared two to four weeks before transplanting. They must be at least 1 meter in diameter; a depth of 25 to 50 centimeters is recommended. The subsoil, if poor, should be removed to a distance of at least 50 centimeters below the surface of the ground. In filling the holes only "top soil" (to a depth of 10 to 15 centimeters) about the holes may be used; care must be taken to avoid introducing grass roots or weed seeds with this earth. A few days before the Pará plants are set in, the holes may be filled nearly full to avoid delay and exposure of the seedling at the moment of transplanting.

Any broken or dead roots should be pruned off with shears or a sharp knife just before putting the plant into the hole.

The earth must be firmed in well around the roots so that there shall be no air spaces or lumps to cause trouble later. If the earth is not sufficiently moist the trees should be watered at the time of transplanting and, of course, as often as may be necessary *until they are well established*.

The proper distance between the holes depends upon local conditions and the plans of the planter in regard to secondary crops. If the plantation is on old cleared ground the trees may be set at 5 or 6 meters, whereas, on rich or recently cleared areas 7 to 9 meters would probably prove better especially if some secondary crop is to be grown during the first few years. There is no serious objection to setting the trees 6 meters providing the weaker trees are removed (tapped to death) as soon as they begin to interfere with the development of the vigorous individuals.

Cultivation.—At no time during the life of the Pará tree may grass of any kind be allowed to grow over the "feeding area" of the roots. The degree of cultivation given to the space between the Para rows will depend largely upon the local con-

ditions. As soon as convenient all brush, weeds, and grass should be eliminated. The surface of the ground, at least near the Pará trees, should be planted with beans or some kind of leguminous cover crop which will not only keep down the grass and weeds but will keep the area over the roots of the rubber comparatively cool and moist, and at the same time furnish nitrogen to the soil instead of poisoning it with root excretions, as in the case of grass.

Due precautions against fires must be taken.

No secondary crop like camotes, cassava, or bananas should be planted nearer than 2 meters from the Pará; after the third year from transplanting no secondary crop, except legumes, may be grown in the plantation.

The kinds of legumes recommended for planting as cover crops in the Philippines are: Centrosema bean; Lyon bean, yam bean, velvet bean, sword bean, and any of the native beans; cowpeas, mani manihan, peanuts, cacahuates, and ipil (*Lucaena glauca*).

The cacahuates, or baloc-balóc, is a shrub or small tree, especially recommended because it may be readily grown from cuttings stuck into the ground; it can be cut back whenever its height exceeds 1.5 or 2 meters, the removed branches helping to increase the humus layer on the ground. The habit of shedding its leaves for a few weeks in the dry season is a disadvantage in using this species: the ipil, or datels, is not deciduous.

If the soil becomes packed, i. e., so wet and clogged that air and water can not readily circulate through it, it should be forked by the vertical process, i. e., by trusting a strong-tined fork down into the ground to a depth of 10 to 15 centimeters, then, after loosening the tines, the fork is withdrawn without breaking the roots.

The young Pará trees must be protected from the depredations of pigs, deer, etc.; a woven wire fence is unquestionably the best means of protection. A very closely planted row of bonga palms (*Areca catechu*) can be utilized after about their fourth year as a live fence; bamboo strips may be woven into it and tied so that even pigs can not force an entrance; or maguey may be planted between the bongas very effectively.

If live mulches, or cover crops, are not used about the young rubber trees some kind of straw or leaf mulch should be kept over their roots except in very rainy weather. The layer of dry grass, rice straw, or similar material should be just thick

enough to prevent the growth of weeds without smothering the Pará roots; it should not touch the stem of the tree; it should be turned over occasionally.

All colonies of white ants (*Termes* spp.) in or near the plantation should be destroyed either by poisoning, fumigating, or "puddling."

All decaying wood should be removed from about the roots of the rubber.

(For further information on this subject address the Director of Agriculture, Manila, P. I.)

BUREAU OF AGRICULTURE EXTENSION-WORK LECTURES.

By H. T. EDWARDS, *Assistant to the Director.*

The extension-work lecture is one of the most widely-used means of disseminating information about agriculture. In many different countries trained men are now sent out by the Government through the farming districts to lecture before the farmers on improved methods of agriculture.

In the Philippine Islands, until recently, it has not been practicable to do any considerable amount of work of this kind. During the past five months, however, from August 10, 1910, to January 14, 1911, five employees of the Bureau of Agriculture have been detailed at different times for lecture work in the provinces. A total of 131 lectures has been given in 18 provinces. The total attendance at these lectures has been about 24,000 people. A part of these lectures has been given for the benefit of teachers attending the normal institutes held in different provinces by the Bureau of Education, while others have been for farmers, and the general public. Many of the lectures have been illustrated by the use of a stereopticon, and others by the use of charts, maps, seeds, and plants, and other illustrative material. In connection with the lecture work at the normal institutes the teachers and students have also been given practical demonstration work in the field and garden.

The extension-work lectures have covered a wide variety of subjects selected with reference both to the agricultural conditions in the different provinces, and the special requirements of the different audiences. Among the subjects discussed have been the following: "Seed selection," "Plant growth," "The vegetable garden," "Plant pests and diseases," "Some ways of improving a Philippine farm," "Rice," "Abacá," "Coconuts," "Tobacco," "Maguey," "Corn," "Farmers' clubs," etc.

The primary object of the extension-work lecture is to awaken an interest among the people in improved methods of agriculture.

At the close of each lecture the people present are requested to question the speaker and in this way discussions are started and new ideas are suggested. Wherever the lectures have been given a surprising degree of interest has been shown in them, and this field of work appears to be one that can be greatly enlarged.

The following is a summary of the work that has been done in the different provinces:

Antique.—Ten lectures were given in San José, Antique, from November 17 to 23, at the normal institute, by Mr. W. A. Mace. A lecture was given each morning to the high school pupils and in the afternoon to the Filipino teachers. One hundred and thirty high school pupils and 116 teachers were in attendance.

Bataan.—Five lectures were given at Balanga, Bataan, from November 28 to December 2, at the normal institute, by Mr. S. H. Sherard. These lectures, together with practical demonstration work given, occupied nearly the entire afternoon of each day.

Bulacan.—As the normal institute was not in session in Bulacan, five lectures were given in the municipalities of Malolos, Calumpit, Bulacan, San Miguel, and San Ildefonso, from December 12 to 16, by Mr. S. H. Sherard. Six hundred and fifty teachers and students attended these five lectures.

Cavite.—Fourteen lectures were given at San Francisco de Malabon, Cavite, from January 9 to 14, at the normal institute, by Mr. S. H. Sherard. One hundred and ten teachers were present.

Capiz.—Five lectures were given in Capiz from November 28 to December 2, at the normal institute, by Mr. W. A. Mace. One hundred and eighty teachers attended these lectures.

Three lectures were given in the municipalities of Capiz and Dao from October 20 to October 23, by Mr. M. M. Saleeby. Six hundred and seventy-five teachers, students, and farmers attended these lectures.

Two lectures were given in the municipalities of Capiz and Dao on October 20 and 22, by Mr. José Gomez. These lectures were attended by about 400 farmers.

Cebu.—Nine lectures were given in the municipalities of San Fernando, Sibonga, Argao, Carcar, Danao, Liloan, Naga, and Cebu, from November 7 to 16, before audiences of teachers, students, and farmers, by Mr. M. M. Saleeby. Eight of these lectures were illustrated with a stereopticon. The total attendance at these lectures was approximately 2,600.

Three lectures were given in the municipalities of Sibonga, Carcar, and Naga, from November 11 to 14, by Mr. José Gomez.

One thousand and one hundred people attended these three lectures, all of which were illustrated with the stereopticon.

Ilocos Norte.—Two lectures were given at Laoag on August 28 and 29 before the provincial high school and farmers by Mr. M. M. Saleeby. These lectures were attended by 130 teachers, students, and farmers.

Ilocos Sur.—Five lectures, all of which were illustrated with a stereopticon, were given at Candon, Narvacan, Vigan, and Sinait, from August 17 to 24, by Mr. M. M. Saleeby. These lectures were attended by 950 teachers, students, and farmers.

Iloilo.—Three lectures were given at Santa Barbara, Pototan, and Passi on October 17, 18, and 19, by Mr. M. M. Saleeby. About 1,500 teachers, students, and farmers attended these lectures. Three lectures were given on the same dates at the same places by Mr. José Gomez, which were attended by 1,500 people. These lectures were illustrated with a stereopticon.

Isabela.—Nineteen lectures were given at Ilagan, Isabela, from November 29 to December 24, at the normal institute, by Mr. Charles A. Mahan. These lectures were illustrated with charts, pictures, a tobacco-seed separator and a collection of seeds. The average attendance at these lectures was about 60.

La Union.—Six lectures, three of which were illustrated, were given in the municipalities of San Fernando, Bacnotan, Bauan, Naguilian, Balaoan, and Luna, from August 10 to 15, by Mr. M. M. Saleeby. About 900 teachers, students, and farmers attended these lectures.

Leyte.—Six lectures, two of which were illustrated, were given at Tacloban and Carigara, from November 20 to 25, by Mr. M. M. Saleeby. The total attendance at these six lectures was approximately 2,000.

Mindoro.—Mr. Sherard was at the normal institute in Calapan but one day, November 4. The entire day was devoted to a series of lectures and practical demonstration work. One hundred teachers were in attendance.

Occidental Negros.—Ten lectures were given in Bacolod, from December 6 to 12, at the normal institute, by Mr. W. A. Mace. Two hundred and sixty-four teachers were in attendance.

Oriental Negros.—Five lectures were given in Dumaguete, from December 19 to 24, at the normal institute, by Mr. W. A. Mace. One hundred and sixty teachers were in attendance.

Nueva Ecija.—Three lectures were given at San Isidro on December 19 to 22, at the normal institute, by Mr. S. H. Sherard. One hundred and ten teachers were in attendance.

One lecture was given at the Agricultural School at Muñoz on December 22 before 100 students of this school by Mr. S. H. Sherard.

Pangasinan.—Five lectures were given in the municipality of Lingayen from November 15 to 18, at the normal institute, by Mr. S. H. Sherard. One hundred and ten teachers were in attendance.

One lecture was given at Salasa on November 19, which was attended by 150 teachers and students and 75 farmers.

Sorsogon.—Five lectures, one of which was illustrated, were given in Sorsogon, from November 28 to December 1, at the normal institute, by Mr. M. M. Saleeby. These lectures were attended by 250 teachers and students. The total attendance for the five lectures was about 1,300.

AGRICULTURAL CONDITIONS IN THE PROVINCE OF NUEVA ECIJA.

By SAM H. SHERARD, *Agricultural Inspector.*

The Province of Nueva Ecija, lying north of Pampanga and Bulacan, east of Tarlac and Pangasinan, and south of the South Caraballo Mountains, has a mean annual temperature of 26.7° (centigrade), a population of 137,147, and a landed area of 2,169 square miles.¹ The soil is composed of shaley clay, black alluvial and sandy loams. This province is one of the first in the production of mangoes and about third in the production of rice, beside producing a considerable quantity of sugar and tobacco. The broad river valleys, extensive areas of grazing land, and other natural resources offer opportunities for great agricultural and industrial development.

AGRICULTURAL LANDS.

There are 90,367 hectares of farm land in the province, this area being divided into about 13,500 farms averaging 6 $\frac{3}{4}$ hectares each. Of this farm land more than 29 per cent is cultivated, 11.4 per cent is in forest, and about 59 per cent is covered with cogon (*Imperata cylindrica*) and other wild growths. Rice, corn, sugar cane, tobacco, and mangoes are the principal crops grown by the farmers. It is estimated that more than 20,000,000 mangoes are harvested annually in Nueva Ecija.²

The province is divided naturally into three more or less distinct farming sections, namely, the southern, the central, and northern. The southern part of the province contains the rich lowlands of the Pampanga and Chico River Valleys, including the towns of Gapan, San Leonardo, San Isidro, Jaen, San Antonio, Cabiao, Zaragoza, Peñaranda, Santa Rosa, Cabanatuan, Aliaga, and Licab. It is rather thickly settled, and devoted largely to raising rice, sugar cane, corn, and tobacco. The rich lands in the Pampanga and Chico River Valleys are natu-

¹ One square mile equals 2.59 square kilometers.

² Census of the Philippine Islands: 1903.

rally adapted to raising sugar cane. The town of San Antonio is situated in the heart of a section which was in former years largely devoted to growing tobacco. The land further north, in Aliaga and Licab, is more exclusively devoted to rice raising. Rice and corn are raised in nearly every part of the province.

The central part of the province includes the uplands of the Pampanga and Chico River Valleys, one of the richest and most beautiful tracts of rolling prairie land, well watered and well wooded, to be found in the Philippine Islands. It includes the towns of Bongabon, with the large barrios of Nazaret and Santor which lie at the foot of the mountain range forming the eastern boundary of the province, Talavera, Santo Domingo, San Jose, and San Juan de Guimba with the large barrio of Muñoz where the Central Luzon Agricultural School is located. Though this section doubtless contains the best farm land in Nueva Ecija it is as yet but sparsely settled. At present only a small portion of this land is under cultivation; however, it is being rapidly homesteaded by people from other provinces.

The town of Cuyapo, which is situated about 240 kilometers (15 miles) northwest of San Juan de Guimba and about 32 kilometers (20 miles) west of San Jose, is in the heart of one of the richest farming sections on the Island of Luzon. This section includes parts of the provinces of Tarlac and Pangasinan, and the towns of Cuyapo and Nampicuan in Nueva Ecija.

In the town of Rosales in Pangasinan is located the well-known "Hacienda Esperanza." During 1909 a branch of the Manila and Dagupan Railroad was built from Paniqui through Nampicuan to Cuyapo giving the people in this section the advantage of Manila markets in addition to the best facilities for travel and communication. The opening of this line of railroad will tend to hasten the development of the towns of Nampicuan, San Juan de Guimba, and San Jose, which are located in the northwest part of the province. Cuyapo is one of the wealthiest and most progressive towns in Nueva Ecija.

The part of the province which lies to the north of San Jose is mostly table-lands of a rough, mountainous character. The northern boundary, the South Caraballo Mountains, is a lofty range. From the extremities of this range two ranges running northward fork out and include the fertile valley of the Cagayan River. About 21 kilometers (13 miles) northeast of San Jose, on the Pampanga River, is the town of Pantabangan, said to have an elevation of about 305 meters (1,000 feet) above sea level; here small patches of rice, potatoes, sugar cane and some coffee are grown. To the north of Pantabangan, about 24

kilometers, near the source of the Pampanga River is Caranglan, a small town of about the same elevation as Pantabangan, in which rice, sugar cane, and tobacco are grown. But few of the people in this section live outside of the *poblaciones* of Pantabangan and Caranglan, and the barrios of Lupao, Puncan and Salazar. Pantabangan and Caranglan are accessible only by mountain trails, consequently the farming is not very extensive. Most of the crops are raised for home consumption; however, there is some trade in deer meat and hides which are sold to the people living in the central part of the province. Between the towns of San Jose, Caranglan, and Pantabangan there are great rolling table-lands on which thousands of horses or cattle could graze. This country being situated at the foot of the mountains, having pure water, and being free from infectious animal diseases, would be a very desirable location for stock raising.

FARM ANIMALS.

Nueva Ecija, like other agricultural provinces, has suffered greatly from the loss of farm animals, more especially draft animals. During the months of January, February, and March, 1909, nearly every town in the province was infected with rinderpest; since that time the disease has been practically stamped out.

At first there was more or less trouble in getting the people to bring their animals into the *poblaciones* to be injected with serum, but lectures and talks on sanitary and quarantine measures were given and as a result their attitude has changed from one of suspicion to one of confidence in this work.

It seems that practically all of the carabaos in the Province of Nueva Ecija were brought from the Provinces of Ilocos Sur and Ilocos Norte. As this disease has appeared in animals from these places, in some cases causing death within three days after their arrival, it would seem that they were infected before they came. As a step toward the total eradication of rinderpest, it would be advisable to place a rigid quarantine on all animals brought into the province.

TRANSPORTATION.

The usual means of transporting agricultural products are by *carretones*, carabao sleds, and upon the backs of men. Owing to the fact that there are very few roads in the central and northern parts of the province, it is almost impossible to transport large quantities of produce to market. In these sections there are thousands of hectares of virgin land partially covered

with cogon and timber. The provincial government is constructing a good road from Cabanatuan, at the end of the railroad, to Muñoz. This road will open up to settlers a large section of country and furnish an outlet for farm products from San Jose and Talavera. The Cabanatuan branch of the Manila and Dagupan Railroad passes through the towns of Cabanatuan, Santa Rosa, Peñaranda, Gapan, and San Isidro, the provincial capital.

Instead of living on their farms, like American farmers, most of the farmers live together in barrios, or *poblaciones* where they remain at night and return to their fields in the daytime. This custom is practiced especially in those sections which are some distance from the *poblaciones* of the towns. The purpose of living together in communities is for protection from *ladrones* or robbers who usually live in the mountains. Since Constabulary soldiers have been stationed in the province, the people have shown a greater desire to live on their farms.

FARM IMPLEMENTS.

Like most provinces in the Philippines, the agricultural implements used in Nueva Ecija are of a very crude order, though on some farms modern agricultural machinery is used, the disk plow being most in evidence. The plow used by the ordinary farmer has narrow shares, shaped like wings. This plow penetrates the soil about 10 centimeters on irrigated lands, but on dry soils the farmer often finds it necessary to plow the land three or four times in different directions in order to cultivate to a depth of 25 or 30 centimeters. Beside these plows crude wooden harrows, rolling harrows, and small tools such as shovels, bolos, etc., are used on the farms.

PRINCIPAL CROPS.

Rice.—In this province many varieties of rice are grown, including lowland or irrigated, upland or nonirrigated, and mountain rice. Cultivation begins by preparing and planting the seed beds; this usually takes place during the first part of June. The preparation of the seed bed consists in clearing a piece of ground about 20 meters square, usually near a well or stream, and working it with a plow until it is saturated with water. A harrow is then passed over it in opposite directions to level the ground and to work it into a muddy mass. At the same time the seed is soaked in water for twenty-four hours and then sown broadcast. When the plants begin to grow it is customary in some localities to sprinkle them with a solution of lime to protect them against insects. A bamboo fence is sometimes built

around the bed to keep out carabaos and other animals. When the young seedlings are 25 to 30 centimeters high in the seed bed they are transplanted to the field which has been previously prepared. The young seedlings are usually topped and tied in bundles of 100 the day before they are to be planted in the fields. They are carried to the fields on carabao sleds where the transplanting is done by men, women and children, who receive from 12 to 20 centavos per day. Transplanting usually begins about the first of July and lasts until the middle of August. Harvesting begins during the latter part of October and ends in December or January, according to the season. At harvest time the palay is usually worth ₱1.80 per cavan, while at planting time it is worth ₱2 or more; according to the variety. There are five large rice mills in the province, two at San Isidro, one at Santa Rosa, and two at Cabanatuan.

Sugar cane.—Sugar cane is grown extensively in the southern part of the province. There are two varieties, the purple and the white; the bulk of the crop comes from the former variety. The cane is planted, as a general rule, on high level ground which is moist and well prepared. The planting is usually done during November, December, and January, the same months in which it is cut for grinding. The cane is allowed to grow twelve, thirteen, or fourteen months, according to the soil in which it is planted. On newly cleared land the period is eighteen months. The sugar is classified according to the way in which it is manufactured and prepared for market. The juice is generally extracted from the cane on the farms, and the crude sugar is shipped to Manila and China to be refined and granulated. On coming from the vats the sugar is put into a receptacle made of baked clay having the form of an inverted cone or a bell known as a *pilon* which serves as a package; the contents of one of these *pilon*es weighs about one quintal (100 to 112 pounds or about 50 kilograms).

Corn.—Corn is found growing all over the inhabited portions of the province. It is planted on soils not suited to the cultivation of rice, and on higher land which can not be irrigated. Where conditions permit, three crops are sometimes raised in one year. The bulk of the crop is harvested while the ears are in the roasting stage, the fodder being fed to carabaos and horses. Instead of the ears drying in the fields, the husks are pulled back over the ears, they are tied in bunches of 8 or 10, and are carried to the farmer's house where they are hung in the sun. With the exception of the roasting ears which are taken to market, very little corn is sold. The stalks are allowed to remain stand-

ing in the fields, after the tops and blades have been removed. All seed corn is pulled after the roasting-ear stage, dried, and in a great many cases is immediately planted.

Very little cultivation is given to growing corn, as it is generally planted as a catch crop. A great deal of corn is planted in May, in water furrows, and is harvested in July, when the transplanting of rice begins. Corn is not, as a rule, gathered at one time but is pulled as it is needed for food.

Tobacco.—Tobacco is grown extensively in the valley of the Pampanga River. This soil is a clay loam and is fertilized with sediment from the overflow of the river. The season for the planting of the seed beds is governed by the character of the soil to which the seedlings are to be transplanted. For high land, where there is no possibility of inundation, the seed beds are prepared in July and August and the transplanting takes place in September and October, while on low lands the seed is planted in October or November and transplanting takes place in December.

Careful growers prepare their seed beds in soil of the same character as that of the field where the tobacco is to be grown, in order that the roots may not suffer from being transplanted. These seed beds are usually made on level land, in plots from 12 to 15 meters square, or large enough for double the number of plants which are required. They are surrounded by a small ditch containing water for sprinkling. The earth from the ditch is placed in the middle of the inclosed section for the purpose of elevating it so that the water may drain off. The farmer works these beds carefully until the soil is pulverized, and sometimes fertilizes them with carabao manure. The large bed is then divided into beds 1 or 2 meters wide, separated from each other by small longitudinal ditches of shallow depth, in order to drain off the rain which might rot the seeds or injure the delicate roots of the plants. After thoroughly pulverizing all lumps on the bed, leveling the surface, and moistening the earth, the seeds are scattered on the soil. Before scattering, the seed is mixed with fine, dry sand, or ashes, in order that it may be properly distributed; it is then lightly pressed into the ground with the foot or a light roller. After the seeds have been sown, the farmer protects them against excessive heat and rain, by means of shelters or covers made of bamboo or banana leaves, with which the seed beds are covered from 10 o'clock a. m. until 4 p. m., on sunny days or when the rains are heavy and abundant. The worms are picked off every morning by the family of the farmer.

After forty-five or sometimes sixty days, when the plants have attained a height of 25 or 30 centimeters, they are transplanted from the seed beds. The method used for pulling the young plants is to moisten the soil, if the weather is dry, in order that the roots may easily free themselves. The most flourishing plants are selected; with a small stick in the right hand, which is inserted in the ground beside the plant to be pulled, the plant is raised toward the surface by a slight pressure of the hand on the upper end of the stick after which it is pulled out with the left hand, together with its vertical root and horizontal rootlets, without the slightest injury. This work is done during the cool hours of the day, between 4 and 9 in the morning and 5 and 7 in the afternoon.

Before transplanting, the grower plows longitudinal furrows about one meter apart in the prepared field. Behind the plow usually follows a member of the family who carries a basket with the young plants in it, and drops them into the furrow one by one, about one meter apart. This person is followed by another carrying a sharp stick, with which he makes holes and sets out the young plants. Care is taken that the central roots enter the holes without bending, to avoid injuring the plants. Care is also taken when watering the plants not to let the water fall on the leaves and break them down.

Miscellaneous crops.—Cacao is grown in different places in the southern part of the province, and coffee is grown near Pantabangan. These two crops would do much better if they received more attention. *Camotes* (sweet potatoes), lettuce, eggplants, and legumes are grown throughout the province. At Peñaranda, *icmo*, the leaf chewed with betel nut, is grown very extensively. It is grown in small plots about 15 meters square, over which are placed covers made of bamboo or banana leaves. Since it is the leaves of this plant that are valuable, the growers pay very close attention to the way they train the running vines.

IRRIGATION.

No large irrigation works are under construction at present, but the San Jose River as it emerges from the canyon about 5 kilometers above San Jose could be dammed so as to irrigate a large territory the year round. All streams flow southwest throughout the province and are diverted by numerous dams for local use, but no dams of permanent material exist. Cuyapo is probably the worst off in regard to water for irrigating purposes, as it is near no large stream. Except in years of drouth, Aliaga loses about 30 per cent of her rice crop by floods. This

place is lower than any other town in the province. The system of irrigation followed in the province is a coöperative one; that is, those farmers whose lands are contiguous and near the same stream, unite in building a dam across the main stream and in constructing mains and laterals to their respective farms. On the main ditch, all the farmers spend an equal amount of time and labor, which is usually done during the dry season or just before the seedbeds are prepared. The individual ditches are kept up by laborers of the interested farmers. The water is distributed among the farmers according to the size of their farms.

Some of these ditches are 15 to 25 kilometers in length; the one between San Jose and the barrio of Bakal toward Talavera being about 19 kilometers long. This irrigation ditch was first constructed in 1856 by Spaniards who, at that time, owned the lands through which it passed. Until 1896 there were three mains, each going in different directions and furnishing water to an area 30 kilometers square. In 1896, these ditches were practically abandoned, and no work was done on them until 1906, when a company of Spaniards and Filipinos bought the hacienda. This company and an American farmer living near Muñoz, opened one of the ditches; portions of another one which passes through the barrio of Muñoz are kept up by farmers who have lands between that place and the barrio of Palosapis, near San Juan de Guimba. This ditch is not as deep or as broad as it was when first constructed, though it carries a stream of water about 30 centimeters deep and 60 centimeters wide. In 1908 a company of Filipinos constructed a dam on a creek between Cuyapo and San Juan de Guimba, by means of which they intend to irrigate their lands. The proper expenditure of about ₱1,000 would make these old ditches carry four times as much water as they do to-day.

PUBLIC LANDS OPEN FOR HOMESTEADS.

Between Bongabon, Talavera, San Jose, and San Juan de Guimba is a broad stretch of public land, which is open to homesteaders; each man or head of a family may take up 16 hectares under the provisions of the homestead law. It is estimated that over 1,000 immigrants from the Provinces of Pangasinan, Ilocos Sur and Ilocos Norte have taken up land for homes near the road between the towns of San Juan de Guimba and San Jose. The population of the barrio of Nazaret north of Bongabon has been doubled by these immigrants settling on homesteads near that place.

As nearly all of this land is intersected by running water, the

farmers partially dam the streams, generally at an angle with the bank, until the water attains a level high enough to irrigate their land. From the main canal, laterals are made to the different homesteads. "Paaga" or early rice is planted on these new lands the first year. The soil is plowed and harrowed three times, the seed is sown broadcast and plowed in and the crop is harvested in from ninety to one hundred and twenty days. On fields that have water available for irrigation, the paddies are three or four times as large as the paddies in fields which depend on the rain for moisture. Of all the immigrants who have thus far taken up land in the province, the Ilocanos seem to be the best workers. This country, being well watered and well timbered, is an ideal location for home seekers.

CENTRAL LUZON AGRICULTURAL SCHOOL.

Situated at Muñoz, a barrio of San Juan de Guimba, on a Government reservation of 657 hectares of land, near the geographical center of the province, is the Central Luzon Agricultural School, which is under the supervision of Mr. A. A. Helm, of the Bureau of Education. This school is a valuable object lesson to the near-by farmers, some of whom visit it almost every day. These farmers, by watching the work that is being carried on at the school, get ideas which, when put into practice, on their own farms, will largely increase their profits.

MONTHLY VETERINARY REPORTS—JANUARY AND FEBRUARY.

RINDERPEST.

Pangasinan.—At the present time Pangasinan is suffering greater losses from rinderpest than any other province in the Islands. For the past six weeks there has been a gradual extension of the infected territory in this province, due to an insufficient quarantine guard. During the past month the number of infected municipalities has increased from six to eleven. During the past few weeks the number of new cases each week has averaged about fifty in the territory which has been inspected. The force of men, however, has been so small that it has been impossible to cover all of the infected territory each week; consequently a large number of cases are not included in the report. The latter part of January a request was made for 700 quarantine guards to be used in maintaining the quarantine over the localities infected with rinderpest. As a result of this request three companies of Philippine Scouts were detailed on this work. These will be distributed largely in the Province of Pangasinan, and the veterinary force in that province will be sufficiently increased to cover the infected territory. With this number of quarantine guards it will probably be possible to prevent further extension of the disease and gradually eliminate it from the municipalities already infected.

Tarlac.—In this province four municipalities are infected. The number of cases reported has been small and the disease has caused no serious losses recently. The force of employees in this province and the number of quarantine guards have been insufficient, but the disease has been kept fairly well under control.

Pampanga.—During the past month seven municipalities of this province have been infected. With a force consisting of 5 veterinarians, 15 American inspectors, and 28 Filipino inspectors, the infected territory has been thoroughly worked, and this will probably result in the number of infected municipalities being greatly reduced in the near future. In this province the

quarantine has been maintained by two Constabulary officers commanding 76 soldiers and 36 municipal police. While this number of quarantine guards has not supplied all the demands, it has been sufficiently large to cover the principal roads and trails leading from the infected territory.

Bulacan.—During the latter part of November, 1910, the number of infected municipalities of this province was reduced to one. On account of the large infected area in the Province of Pampanga only nine Constabulary soldiers were left as quarantine guards for the infected municipality of Bulacan. Recently rinderpest has appeared in three other municipalities of this province. The origin of this infection has not been determined, but it is quite possible that it was brought from formerly infected municipalities by animals being taken through quarantine lines.

Nueva Ecija.—During the past few weeks there have been three or four infected barrios in this province. One veterinarian has succeeded in keeping the disease under control.

Nueva Vizcaya.—For some time there has been one infected municipality in this province. Although it has not been possible to completely eradicate the disease, the quarantine has succeeded in keeping the clean territory from becoming infected.

Cagayan.—The Province of Cagayan contains two infected municipalities, but the losses have not been at all serious.

Isabela.—In this province the situation is practically the same as in the Province of Cagayan. It also contains two infected municipalities.

Oriental Negros.—Of all the southern provinces Oriental Negros has the largest infected area, having eight infected municipalities. During the past month 3 veterinarians and a large force of inspectors have been working on this outbreak. Although they have not succeeded in greatly reducing the extent of the infected territory they have kept the losses confined to a comparatively few cases. The work of eradication in this district has been greatly impeded by the lack of a sufficient number of quarantine guards. While 45 Constabulary soldiers have been on duty there for some time, the great extent of territory to be covered requires more than twice this number.

Cebu.—At the present time there is one infected municipality in this province. Rinderpest has existed in Cebu for several months, but recently it has been so well under control that the losses have been confined to five or six animals per month.

Leyte.—The situation in the Island of Leyte has greatly im-

proved during the past few weeks. At the present time only two municipalities are known to be infected, and the losses being sustained are comparatively small.

Bohol.—The infected territory in the municipality of Talibon which resulted from the bringing in of cattle from one of the adjoining infected islands, has recently been reduced to one barrio, which is now under a quarantine maintained by Constabulary soldiers.

Surigao.—There has been a great deal of difficulty in obtaining a sufficient number of quarantine guards for this province. For some time 10 Constabulary soldiers have been detailed on this work, but this number was entirely inadequate. Recently 15 special policemen were secured and this force of 25 quarantine guards has succeeded in covering a large part of the infected area. The disastrous results of not having a sufficient number of quarantine guards at the beginning of an outbreak are shown by the fact that rinderpest has made its appearance in the municipality of Gigaquit, several miles south of Surigao.

Moro.—Three months ago the losses in the Davao district from rinderpest far exceeded those of any other province in the Islands. Several large herds were almost completely wiped out, and the number of deaths averaged more than 100 per week. Upon the arrival of a representative from this Bureau very stringent measures were adopted to secure the eradication of rinderpest from this district and no quarantine or sanitary measures were overlooked. The provincial officials have been very enthusiastic in their efforts to eradicate this disease, and they have adopted and carried out practically all the recommendations made by this Bureau. Practically all animals found suffering with rinderpest, and a large number of the exposed have been slaughtered, and the Philippine Scouts have been used to maintain the necessary quarantine. The success attained in this district serves to illustrate what can be done in the line of disease eradication when all means and facilities are placed at the disposal of the men in charge of the outbreak. The situation now appears to be well in hand, and unless the infection has reached the mountain districts, where it is almost impossible to cope with this disease, the eradication of rinderpest from this province will probably be accomplished in the near future.

From the provinces which have not been mentioned there are no authentic reports of rinderpest. A few weeks ago the Provinces of Iloilo and Occidental Negros each contained one infected municipality. In these two provinces very stringent methods

were adopted, and all exposed animals were tied up for several days in order to prevent them from drinking in infected streams or pasturing on infected fields. Although these measures caused numerous complaints from the stock owners in these localities, they were continued for a length of time exceeding the period of the incubation of the disease with the result that the infection was eradicated from these provinces. They have now remained free from disease for several weeks, and the advisability of such measures seems sufficiently demonstrated.

MONTHLY CROP REPORTS—JANUARY.

ABACA.

Surigao.—Abacá throughout the entire province is in good condition. Some complaint is heard among the merchants that the farmers in certain sections of the province do not clean the fiber satisfactorily.

COCONUTS.

Oriental Negros.—Coconuts are one continuous crop which yields as good returns with as little attention as any crop that farmers can devote their attention to.

Surigao.—Coconuts throughout the province are in good condition.

COFFEE.

Mountain Province.—The coffee crop has been picked and sold, the average price being ₱16 per cavan. It is possible that in the future this section will be in a position to export large quantities of coffee, as it grows rapidly here and is of excellent quality.

CORN.

Bohol.—Some little damage was done to corn by windstorms during the month of December, but no serious losses were suffered. Corn is grown more extensively in the vicinity of Calape and Tubigon than in any other part of the island. In the vicinity of Loon and Maribojoc corn is a rather important crop and at the present time is in very good condition.

Cagayan.—Some corn has been planted during the month and it, in common with all the other growing crops, is badly in need of rain.

Cebu.—The corn crop has suffered greatly, especially on the west coast, because of the dry weather and in many cases will be almost a failure. The shortage in the last crop of corn is now beginning to be felt. The price has risen to ₱4 per cavan, the ordinary price being from ₱2.50 to ₱3. As a result of the high price corn is now being brought in from Negros and Bohol.

Iloilo.—In the southern part of the province about all that has been done during the month has been the planting and

cultivation of corn, which is the chief crop in that part of the province.

Oriental Negros.—A small amount of corn was harvested during January and some remains in the fields at the end of the month nearly ready to be picked.

Tarlac.—In some places in this province the ground is so dry that there will be a shortage of the corn crop.

COTTON.

Ilocos Norte.—Cotton is growing well and there is every promise of a good crop.

GARDEN VEGETABLES.

Antique.—An experimental garden has been started by the representative of the Bureau of Agriculture in the municipality of San Jose and so much interest has been taken in this work by the people that a number of other gardens have been planted. A prize of ₱20 has been offered for the best garden in this municipality.

Mountain Province.—The people in this province are gradually learning that different vegetables should be planted at different seasons and are also learning the methods by which each can be best cultivated. Until this information is very generally disseminated there will be no regular supply of vegetables.

GUINEA GRASS.

Mountain Province.—In January two different lots of Guinea grass roots were brought into this province from Baguio by the resident veterinarian of the Bureau of Agriculture. These roots were distributed in Suyoc, Cervantes, and Bontoc, and it remains to be seen what results will be obtained.

MISCELLANEOUS CROPS.

Bohol.—During the month there has been very little rainfall in the northern part of the Island and as a consequence the crops are suffering a little from drouth. Farming is not carried on very extensively in this part of the Island, not so much because of lack of work animals, but for the reason that the country around Getafe, Talibon, Ubay, and Sierra Bullones is very thinly populated and no great amount of rice, which is the only crop planted, except a small amount of corn, is needed to supply the needs of the people. In the vicinity of Calape and Tubigon crops are in a thriving condition, that being the richest part of the island. Two very enterprising farmers live in that district and attention is given to the raising of corn, sugar cane, and rice.

Cotabato.—Wax, biao, and copal are still being purchased in large quantities and shipped to Zamboanga and Singapore.

Tayabas.—Crops of all kinds have been good and the province is on the boom. Money is plentiful everywhere and prosperity is shown in the great number of new houses being erected in every municipality throughout the copra-producing section, and especially in Lucena.

MULBERRY.

Mountain Province.—Mulberry trees have been set out in Bontoc and are growing rapidly, while those in Cervantes, because of faulty planting, are rather backward.

RICE.

Antique.—It has been estimated that the municipality of Dao harvested about 70,000 cavans of palay from the last crop. This is nearly three times the crop of 1909, which means that the municipality has produced enough to supply its own needs and possibly have some surplus. Considering the shortage of Sibalom and San Jose crops this large harvest is very fortunate. Patnongan, San Jose, Sibalom, and San Remigio claim a joint shortage of about 86,000 cavans on this year's crop. The shortage in the northern municipalities of the province is proportionally greater.

Owing to the small amount of rice cultivated the past year the price of palay is now in some municipalities as high as ₱3 per cavan and is expected to go still higher. There is no municipality in the province where the price is lower than ₱2 per cavan. This is new palay and the old palay is much more expensive. The farmers of this province have been recommended to plant more corn and to plant it earlier as the amount of palay gathered this year will not be enough to supply the local demand.

Bohol.—There was sufficient rainfall during the month of December for the preparing of the fields and the planting of rice, and in most places the planting was completed during this month. On January 1 the young rice was in a thriving condition.

Bulacan.—There seems to be some divergence of opinion among the inhabitants of the province regarding the sufficiency of the rice crop. While some state that there was a fair average crop, others claim that there is a considerable shortage, due to drouth. This applies particularly to that portion bordering on the Candaba swamp and around San Miguel, which is considered the finest rice-growing section in the province.

Cagayan.—In the rice-growing section along the coast rain has been plentiful. Most of the early rice—i. e., that planted

on irrigated land—has been harvested. The harvesting of the late rice is just beginning.

Capiz.—In Capiz Province all of the rice in the Mambusao Valley and from Dao to Capiz has been harvested and was being thrashed during the month of January. In the municipality of Panitan there is one thrashing machine run by a small traction engine.

Cebu.—Rice is partly harvested, a portion of the crop having suffered because of lack of water. There has been very little rain and there has been a shortage of water in the irrigated districts.

Cotabato.—During the month of January 4,000 cavans of palay and 700 cavans of rice were shipped by Chinese merchants to Zamboanga and Jolo. The entire rice crop has not yet been harvested and the Moros report that it will be the largest crop ever grown in this district.

Ilocos Norte.—In San Nicolas 500 hectares more are planted to rice this year than last. The crop is of better quality than last year. In Solsona there is some excellent rice land which is easily irrigated. The crop early in December was just heading and promised a very good yield. In Dingras the rice crop is much earlier than in the neighboring municipality of Solsona. Considerably more than half of the crop had been harvested by December 1 and the remaining portion was being harvested as fast as possible.

Iloilo.—The rice crop has been practically all harvested and the yield is estimated to have been about one-third of an average crop for the entire province. Among the indications of prosperity in this province is the fact that a company having a capital of ₱100,000 is now building a rice mill in Pototan.

La Laguna.—There were two floods during the month and a little damage was done to the rice, nevertheless, the farmers report an abundant harvest.

Mountain Province.—Practically all Igorot rice land was being planted during the month of January. Rice land of Cervantes and Tagudin will be vacant until the beginning of the rainy season, thus giving those districts one instead of two crops a year.

Oriental Negros.—The rice crop throughout the area inspected is quite uniform and should be ready to harvest within a few weeks.

Rizal.—The rice crop will, as a whole, be better than last year. In some sections, however, it is poorer. Parañaque will have a poor crop. In Montalban and San Mateo the crop will

be about 25 per cent less than last year. Several barrios of Taguig, Pateros, Las Piñas, Pasay, and Caloocan have poor crops, while at Pamplona the rice is infested with a rust.

Surigao.—Rice will be hardly half a crop in the Surigao Valley, owing to rinderpest.

Tarlac.—The greater part of the rice crop had been harvested at the end of December. The yield for the whole province will be about one-fourth short of last year.

Zambales.—The present outlook for this year's rice crop is excellent. The province has lost something over 200 work animals by disease during the year. Nevertheless, the prospect is that a larger and better rice crop will be harvested this year than for the past two years. In the lowlands around San Narciso, San Antonio and San Marcelino the greatest yield will be had. The caingin rice is already being harvested as this is always the earliest crop. Farmers around Santa Fé state that rats are destroying considerable of their caingin rice.

RUBBER.

Cotabato.—The Para rubber planted by the Rio Grande Rubber Company on their estate at Reina Regente is doing well and has demonstrated that the soil and climatic conditions in the Cotabato Valley fulfill the necessary requirements for successful planting of this product.

Mountain Province.—Para rubber seeds have been planted in Bontoc and Cervantes.

SUGAR CANE.

Bohol.—The only part of this island in which sugar cane is grown to any extent is in the vicinity of Calape and Tubigon, where there are two small haciendas.

Bulacan.—Sugar cane, which is raised to some extent around Polo, Obando, Malolos, Quingua, and Calumpit promises an excellent yield this year.

Cebu.—Sugar cane has been mostly harvested and it is reported that there has been a good yield.

Ilocos Norte.—In San Nicolas the sugar-cane crop is larger and better than that of last year.

Iloilo.—Throughout the province wherever sugar cane is raised the farmers have been devoting all their time to the work of cutting and grinding, as well as the preparation of new land and the planting of it to sugar cane. In the northern part of the province along the Philippine Railway there is much new land being plowed and planted to cane. In the northern part of the municipality of Passi a Spanish company is preparing to

plant several hundred hectares of sugar cane, all this being new land that has probably never been planted to sugar cane before.

The difficulty experienced last year in planting sugar cane was lack of work animals and lack of cane for planting. This year the number of carabaos in the sugar districts has been almost doubled on account of importation from Cochin China and from other provinces, and also to some extent from natural increase. There is also an abundant supply of cane for planting and many of the smaller planters are not grinding their cane but are using it all to plant their own and their neighbor's haciendas. It is estimated that the amount of sugar cane planted this year will be more than double the amount planted last year.

A few new mills have been imported and a number of old mills have been repaired and placed in running order. It is said that a large number of new mills are to be put in the coming year in order to grind the cane now being planted. The best mill in the province has recently been installed by two progressive American hacenderos. They have a new five-roller mill which will extract 83 per cent of the sugar from the cane and which has a capacity of from 90 to 100 piculs of sugar per day. They have a considerable amount of cane to grind this year and are planting about five times as much for the coming year. They are also supplying all of their neighbors with seed and besides grinding their own cane will grind the cane of all the small haciendas in the immediate vicinity. This plantation is situated in a river valley three miles west of Dueñas, which contains some of the best sugar land in Panay and which will produce at least 100 piculs of sugar per hectare. This district formerly contained a number of haciendas, but the land has not been cultivated for some years. The present indications are that this section will soon be in a more prosperous condition than it ever has been before. The greatest difficulty with which these planters have to contend is the fact that there is no road whatever from their mill to the railroad station, three miles distant.

La Laguna.—The cane fields are in fine condition. The sugar planters complain of too much rain and have been unable to begin cutting on that account.

La Union.—All sugar-cane planters are busy making sugar and the crop is a good one although the price is considerably lower than last year.

Oriental Negros.—Sugar cane is now being harvested and the sugar cane fields are already being plowed and planted. The weather has been ideal for this work during the past month. The quarantine on account of rinderpest has caused some incon-

venience to the sugar planters in the infected districts but they have devised means of transportation without cattle and carabaos by using men, horses, cars, and boats to transport the cane and sugar. The work seems to go on about as rapidly, but probably costs a little more.

Rizal.—The sugar crop will be better than last year. There is also a larger acreage planted.

Tarlac.—The sugar crop throughout the province will be good. Sugar cane here is in excellent condition and the only danger is from cogon fires, against which there have been several alarms.

Zambales.—A small amount of sugar cane, which is rather inferior in quality, has been harvested.

TOBACCO.

Cebu.—The tobacco crop is short owing to the fact that large numbers of young plants have been washed away by the heavy rains of November and December.

Ilocos Norte.—The tobacco crop is growing well and looking very thrifty.

Iloilo.—Some tobacco is now being planted in the southern part of the province. In the rest of the province great activity is to be seen in planting tobacco. The area planted to tobacco this year will be greater than that of last year.

Isabela.—In the tobacco-growing section of the Cagayan Valley the month of January has been noted for the extremely dry weather and the work of planting tobacco has been considerably retarded, owing to the impossibility of getting the land in shape for transplanting. Many plants that have been transplanted have died for want of moisture and many others will soon die unless rain is forthcoming.

La Union.—Owing to the drought it is believed the tobacco crop this year will be very short. The showers that usually occur during January were lacking and tobacco is dying.

CURRENT NOTES.

THE PANGASINAN FAIR.

(January 29 to February 4.)

We are indebted to Mr. Sam H. Sherard, agricultural inspector, for the following account of the fair and carnival which was held in the town of Lingayen, Pangasinan, during the week ending February 4.

At the opening of the exposition Judge James C. Jenkins, of the Court of First Instance, in a very strong address emphasized to the people of Pangasinan that manual and intellectual labor are absolutely necessary for the complete development of genuine manhood and womanhood; that there is absolutely no excellence without great and unceasing labor.

The exhibit of the industrial and agricultural products of the province was preliminary to the preparation of the provincial exhibit at the Philippine Carnival which was held in Manila February 21 to 28. The place assigned to the exhibition was an inclosure adjoining the plaza of Lingayen which was filled with booths, the larger part of which was assigned to the exhibits of the different towns of the province, about thirty in all.

The best exhibits were those from the towns of Santa Barbara, Mangaldan, Calasiao, San Quintin, and Lingayen. The town of Santa Barbara exhibited 62 varieties of rice and some very fine specimens of lace work and embroidery. Ribbons indicating the first, second, and third prizes were awarded by a committee of judges.

The first prize for the best municipal exhibit was awarded to Santa Barbara. The exhibit of Mangaldan was quite remarkable for the specimens of coconuts raised in the town, some of which measured 88 centimeters in circumference.

The town of Calasiao amongst many other things included a fine collection of native hats. The importance of the hat industry of Calasiao is well known throughout the Philippine Islands. The towns of the eastern part of the province exhibited a great variety of leaf tobacco; some of the leaves measured 76.20 centimeters in length and 55.88 centimeters in

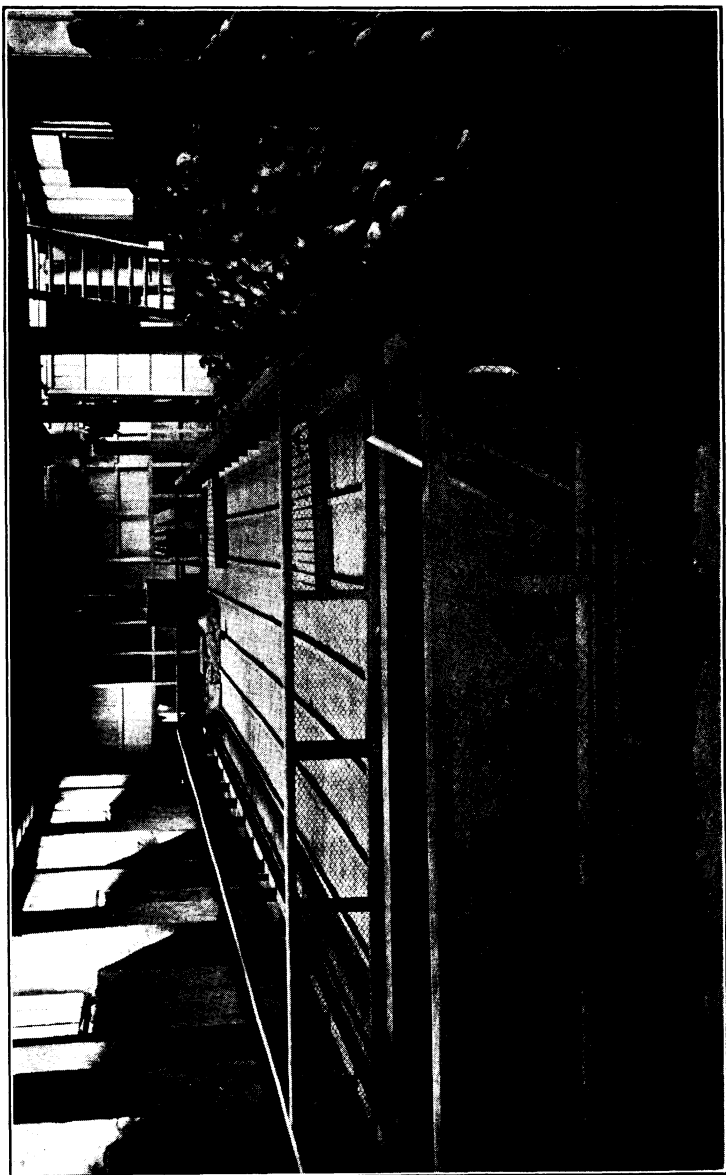


PLATE II.—COCONUT DRIER USED IN LA LAGUNA PROVINCE.

breadth. Pangasinan is one of the first rice-growing provinces in the Philippines and the exhibits of rice, corn, coconuts, and tobacco as well as the exhibits of woodwork and other industries were a great credit to the energy and enterprise of the people and officials. While sugar cane is one of the leading products of the province, this industry received but little attention at the fair. There was also a small exhibit of live stock, such as native ponies, cattle, pigs, and poultry.

In addition to the agricultural and industrial exhibits a series of popular lectures were given by the representatives of the Bureau of Education, the Bureau of Health, and the Bureau of Agriculture. The first day was devoted to lectures on sanitation by the representatives of the Bureau of Health and the veterinarians of the Bureau of Agriculture. On the second day lectures on educational work were given by the division superintendent of schools and some of the leading teachers of the province. The third day was devoted to lectures by the provincial governor and other officials on provincial matters. The fourth day set apart for lectures on various phases of agricultural work and the leading crops of the province.

The evening of the last day was devoted to carnival features, the election of the carnival king, queen, and the various officers of their court. The fair which was pronounced a success by every one who visited it was largely the result of the work of the provincial governor, the provincial treasurer, the acting division superintendent of schools, and the third member of the provincial board in coöperation with the municipal officials and leading farmers of the province. It is planned to make the exposition a regular feature which will be held from year to year.

COCONUT CONDITIONS IN LAGUNA.

By O. W. BARRETT.

During the latter part of the past year the writer made a visit to the College of Agriculture at Los Baños where he inspected the various nurseries, fields, and plats under cultivation by the students of the college. From Los Baños a journey was made to Santa Cruz, the provincial capital, and from there to Majayjay, Lilio, and Pagsanjan.

Only at a point about midway between Santa Cruz and Magdalena were there noted any active cases of bud troubles in the coconuts; here three trees with dead leaves (one with live fruits) were found at a short distance from the highway; the trunks of the affected trees were severely attacked by a com-

paratively small boring beetle. There was no odor, and no insects were noticed about the top. Only one stump was noted near the trees and the leaves and buds of a felled tree had not been burned. I judge this disease can not be the genuine "bud rot" which caused so much loss to the planters a few years ago. Discussions with the president of Lilio and others led me to believe that "bud rot" always kills the trees quickly and never allows the retention of any fruits after the death of the leaves; however, a rare affection is known among the coconut planters, corresponding to the cases here mentioned, in which the fruits are retained, and from which the trees may recover.

About ten dead and leafless trunks were seen standing at the edge of a plantation some 4 to 6 kilometers below Majayjay; very possibly these had been killed by "bud rot," and the trunks had not been felled as they should have been.

Considering the very close planting—5 to 7 meters—the health of the trees was all that could be expected; the yield, however, is probably not more than one-third of the normal amount for mature trees when well spaced. In a very few cases was there noted any attempt at cultivation between the trees, and absolutely no cases of "clean cultivation" were seen. Near Santa Cruz, gabe, yams, and ginger were noted growing between rows of very old trees. A remarkably large percentage of mature trees were practically without fruits, due, doubtless, to the overclose planting and the utter lack of attention. If one-half the trees in some plantations were felled it is believed the yield of the area would be doubled.

According to the president of Lilio, the former planting distance was 10 varas (8.4 meters), but on account of the prevalent custom of selling coconut plantations at so much per tree, irrespective of quality, the present distance of 5 by 6 or at the most 6 by 7 meters has become very general.

Save at the Agricultural College at Los Baños very few coconuts were badly attacked by the oryctes ("uang") beetle. Practically no scale insects or fungus diseases were noted on the leaves anywhere.

Another great fault in the planting method of the Santa Cruz district is the setting out of young plants between the rows of the old or very unproductive trees: no case was noted of the felling of old trees in order to permit the growth of these young plants.

At Pagsanjan, the native oil mills and Señor Navarro's copra dryer were inspected. There is no question that some form of artificial dryer is very urgently needed in the Laguna coconut

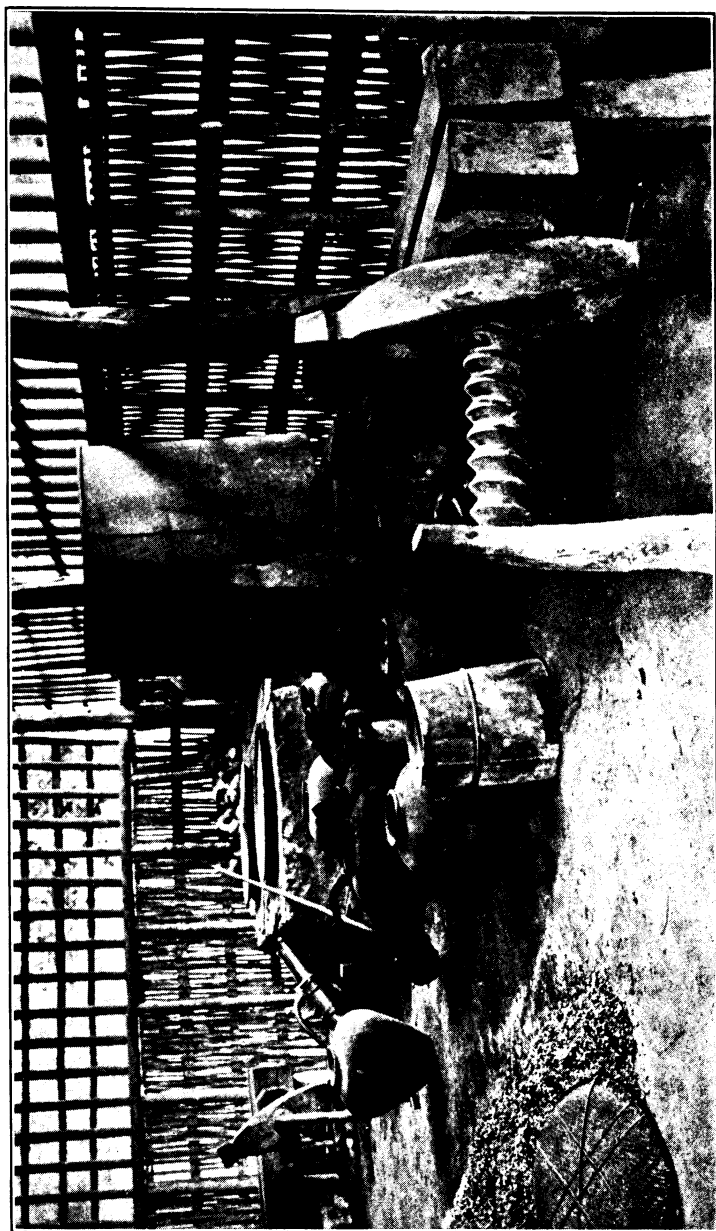


PLATE III.—NATIVE COCONUT-OIL MILL USED IN LA LAGUNA PROVINCE.

districts: first, because the smoke (creosote) permeating entire chunks of copra must render them unfit for higher uses such as making coconut butter, etc.; secondly, because the present method of drying over the husk and shell fire of the "tapahan" does not sufficiently reduce the moisture and in consequence several forms of mold are noticeable on the product when it is ready for bagging, and this undoubtedly results in the loss of a considerable amount of the oil from the copra while en route to Europe. The native oil press does not, of course, remove all of the oil, as would a modern hydraulic or even a metal screw press; however, the quality of "cake" should be very high for feeding purposes because of its freshness and high oil content. I would suggest that one of the Hamel Smith patent rotary machines, which are claimed to completely dry copra in from two to three hours without a trace of smoke in the finished product, be tried; one of these machines if set up either in Manila or Pagsanjan to demonstrate its usefulness to planters would, I believe, revolutionize the business in these Islands.

Considering the status of the coconut business in the Laguna districts, and comparing it with the same status in other countries in which I have had experience, I do not hesitate say that the coconut planters in the districts inspected on this trip are getting only about to 30 to 40 per cent of the proper income from their plantations. And since there appears to be very little or no loss from insects or fungus pests, and since the soil and the climate appear especially well suited for this culture I firmly believe that the said loss is due to the *faulty system of planting*, and to the *lack of cultivation and live legume mulching* in the plantations.

THE BACOLOD FAIR.

The Bacolod Fair opened on the morning of December 13. The Governor-General arrived at 5 in the afternoon, after which the parade took place; in the evening a reception was held for the Governor-General's party.

During the first day there was a convention of presidentes and a conference of planters. Both conferences discussed many matters affecting the welfare of the province. The principal subject of discussion by the planters was the question of importing foreign labor to cultivate the sugar plantations of Negros. Señor Esteban de la Rama made the principal address in favor of the proposition.

During the fair a number of speeches were delivered in the exposition building. Nearly all of the towns were represented

by agricultural and industrial exhibits, which were well displayed and a great credit to the exhibitors. One town, Kabankalan, attracted much attention on account of its rice exhibit; ninety-seven varieties all of which are grown in Kabankalan were on exhibit. Señor Juan Araneta had an exhibit from his own hacienda, which was separate from that sent in by his municipality. The athletic contests between the competing teams and members of the Visayan Athletic Association, which were held during the fair, were very good. After the regular events were over the Iloilo High School team played a game against a picked American team, which resulted in a score of 19 to 4 against the high school. The star feature of this game was a three-bagger by Governor-General Forbes, when the bases were full.

The closing function was a grand mask ball. Costumes of every variety and description were seen. The fair brought to Bacolod the largest crowds which have been seen for many years.

THE ILOILO FAIR.

(February 1 to 5.)

The fair opened Wednesday afternoon February 1 in the plaza at Jaro and was a revelation to its most ardent supporters. The principal towns in the province vied with their neighbors in exhibiting the best and largest variety of products, and the result was thousands of articles, the product of the farms and shops, live stock and other exhibits of interest gathered and arranged for inspection.

The agricultural display included samples of the best grades of sugar produced in the province, some of the largest and best stalks of sugar cane from Iloilo and Capiz Provinces, some of the finest hemp fiber grown in the Islands, samples of the different varieties of tobacco leaf grown in the province, many varieties of rice and fruits, for which prizes were awarded. The town of Sara sent an exhibit of eighty-five different kinds of rice raised within its borders. The Insular Lumber Company had an excellent display of hard woods and other forest products.

There was a live-stock section in which were exhibited horses, cows, carabaos, goats, sheep, and hogs, which represented the best stock raised in the province. There was also a small exhibition of fancy bred canines owned by Iloilo dog fanciers.

The industries and arts of the province were represented by the finest display ever seen in the Visayas containing thousands of patterns of sinamay, piña, jusi, and cotton cloth of many weaves and designs. There were many varieties of native

hats made in the towns of Pototan and Dumarao, and beautiful specimens of embroidery and lace work.

Beside agricultural and industrial exhibits there was an interesting exhibit of fisheries. This included not only live specimens in tanks but many varieties of dried fish, also fishing paraphernalia, such as traps, nets, seines, hooks, baskets, etc.

The leading commercial establishments of Iloilo arranged interesting and elaborate exhibits and the Philippine Railway Company had a most extensive display of the products from the territory along its line. Among the commercial exhibits those of the following firms were noted: Castle, Bros. Wolf & Sons, The Visayan Drug Company, Vargas Plow Factory, W. H. Lambert & Co., The Iloilo Electric Company, Mr. Rogers' roof paint, Hoskyn & Co., De la Rama's Sons, Villa de Panay, La Asamblea Cigar Factory of Molo, Parsons Hardware Company, and the Park Livery Stables.

The plaza of Jaro, large as it is, proved entirely too small. At last a way has been found to interest the people of the province and stimulate their pride in the quality of their work and products through comparison and rivalry with their neighbors. We learn that the fair was such a decided success financially beside having brought the various business interests of the section closer together, that it has been arranged to make it an annual affair, and February 1 to 5, 1912, has been set as the time for the next fair. Over 10,000 entrances were recorded for the five days of the exposition.

MORO PROVINCE AT ZAMBOANGA.

(February 7 to 14.)

The fair opened on the morning of the 7th with a spectacular parade in which 10,000 men of many different tribes participated. At 10 o'clock the fair was formally opened with an inaugural address by Governor-General Forbes. Addresses were also made by General Pershing, governor of the Moro Province; the Hon. Sergio Osmeña, Speaker of the Philippine Assembly; Governor John P. Finley, of Zamboanga; the Sultan of Sulu, and Datus Mandi and Piang. These men spoke of the peace and harmony as well as the coöperation shown by the different tribes and people from the different islands and parts of the province. The whole exposition in fact spoke for peace and coöperation which means prosperity heretofore unknown in the history of this part of the Islands.

The fair grounds were just beyond the ice plant on the road to Calarian. Each district had a separate exhibit of its own,

the principal ones being those from Zamboanga, Lake Lanao, Cotabato, Davao, and Sulu. Each exhibit was arranged in the following groups: Agricultural, forestry, industrial, and fisheries. Beside the district exhibits there was a very interesting exhibit by the schools of the Moro Province which included many products of the industrial schools in Zamboanga.

The agricultural exhibits of the different districts consisted principally of samples of hemp, coconuts, copra, corn, cassava, rice, tobacco, sugar cane, coffee, cacao, a few samples of rubber, vegetables, and fruits. Castle, Bros.-Wolf & Sons had on exhibition various kinds of machinery for use on farms and plantations.

The live-stock exhibit consisted principally of horses, cattle, carabaos, goats, sheep, swine, and poultry. A Morgan stallion, Indian cattle, guinea pigs, and rabbits were exhibited by the Bureau of Agriculture.

The industrial exhibits consisted principally of furniture, native cloth, needlework, hats, clothing, and native weapons, etc.

The forestry and botany exhibits furnished by the large mill owners of Mindanao and of the bureaus of Forestry and Science from Manila were very interesting. There were specimens of a large variety of the best forest trees grown in Mindanao and in fact in the Philippines. This exhibit was one of the most attractive on the fair grounds.

The fishery exhibit which was principally from the districts of Jolo and Zamboanga was of more than ordinary interest in that it contained specimens of pearl shells, pearls, and pearl-fishing outfits representing an industry which is found only in the Moro Province. Mr. Frank L. Strong, of Manila, had on exhibition some samples of diving suits similar to those used by the pearl divers of Jolo.

Wednesday, February 8, was Cotabato day. The principal feature of the day was a military review by Maj. Gen. J. Franklin Bell, commanding the Philippines Division.

Thursday, February 9, was naval and aquatic day. In these events many vintas and other Moro craft gaily decorated and flying the banners of their respective chiefs took part. There were swimming races and boat races between the crews from the U. S. steamers *New York*, *New Orleans*, and *Albany*.

Friday, February 10, was Sulu day. The principal feature of the program was the parade by the different tribes from the Sulu district in which the Sultan in his royal native costume was a very conspicuous figure.

Saturday, February 11, was Davao day. The events of the

day were in the hands of the chiefs and officials of the Davao district. A striking feature of the Davao parade was an elephant carrying a very attractive exhibit of Davao hemp which was prepared by the planters of that district. Davao is famous for the superior hemp fiber which it produces. Another feature of the day's program was the hemp-stripping contest between the McLane and Crumb hemp machines. The hemp used for this test was of the Maguindanao variety from the San Ramon farm. The horse and cattle shows took place in the afternoon.

Sunday, February 12, was flower day. The feature of this day's program was the flower parade which consisted of automobiles, carriages, floats, etc., decorated with flowers, and men, women, and children carrying flowers.

Monday, February 13, was Zamboanga day. The officials of the Zamboanga district were in charge of the program for the day. Altogether the people of the Moro capital and Zamboanga district made this day one of the most enthusiastic of the fair.

Tuesday, February 14, was Lanao day and the last day of the fair. In the evening a grand parade and torchlight procession constituted the closing function.

The annual field tournament of the Department of Mindanao which included sham battles, cavalry rough riding, packers' contests, baseball games, etc., was one of the most interesting features of the fair. Daily concerts were furnished by the four military bands and the Philippines Constabulary Band from Manila. Immense crowds of people from all parts of the Moro Province, from Manila and many of the provinces thronged the grounds each day. Civil and military officials, merchants and planters shared in the success of the Zamboanga Fair which has gone into history as a landmark in the progress of the Moro Province.

SCHOOL GARDENS IN THE PROVINCE OF ANTIQUE.

The Antique School Bulletin for January 25, 1911, contains the following note regarding school garden work in that province:

The interest of the teachers is being aroused this year as never before. At the beginning of the school year, the supervisor offered a prize of ₱10 for the best and ₱5 for the second best garden in the district. Many schools entered enthusiastically, and the results of their labor are certainly encouraging. At San Pedro an early garden was planted to native and American vegetables. The plants were thriving exceedingly well until the storm of November 1st came and swept them away. The American variety of corn was just in full silk and gave promise of a splendid yield, and the American variety of okra was bearing nicely. The gardens at Guintas,

Badiañgan, Pantao, and Buhang were likewise destroyed by the storm after giving promise of being a great success. However, at Guintas another has been started and gives promise of good results.

At San Jose Central, owing to the fact that the ground had to be cleared of trees, stumps and other rubbish, the pupils were late in planting. However we have a nice young garden and shall have an opportunity to see which is more successful, the garden with or without irrigation.

Too much can not be said of the success of the Antique teacher in his school gardening. Everything that was planted thrived wonderfully and one encouraging result is that the interest of the people is aroused and they are daily inquiring for seeds.

The following varieties of plants are growing to perfection: Pechay, mustard, lettuce, pepper, turnip, radishes, cabbage, tomatoes, carrots, green curled lettuce, and beets.

The teachers and pupils are keeping a record of each planting, and we hope in another year to have some reliable data to work from. Gardening in Antique Province is no longer an experiment. We know that it can be made a success.

NOTES FROM OTHER FIELDS.

ORANGE TREE CULTURE.

According to Mr. T. R. Wallace, pruning is a phase of orange-tree culture which receives but little attention, and he considers it one of the important details. In the Porto Rico Horticultural News for October (Vol. III, No. 10) he gives an account of his experiments and observations, stating that if an orange orchard is on healthy root, in suitable soil and climate, and the trees kept healthy by proper fertilization, the value of the crops can be greatly enhanced by pruning. Mr. Wallace goes on to say that the principle object of his experiments was to find what methods of culture must go hand in hand with the use of fertilizer to obtain the most desirable results, in quantity and quality of the fruit. In the attempt to produce quantity by direct fertilizing, an abundance of fruit wood was grown which died instead of producing fruit and the deadwood was invariably found inside the tree. Concerning the cause and best remedy for this, we quote the following from Mr. Wallace's article:

The inclination of the citrus trees after a few years is to grow top, and the top usually forms like a pyramid over the center of the tree, shutting out the light and air from the center or inside of the tree. This deprives the tree of considerable bearing surface inside and the crop is borne mostly on the outside. As this becomes habitual, even though we fertilize ever so cleverly to produce fruit wood, the interior fruit wood dies from simple inanition, and practically the bearing of inside fruit stops. This can not be corrected by simply cleaning out the interior of the tree nor by thinning out fruit wood from the side. The letting in of light and air through the sides of the tree is of no important value, and indeed the denser the foliage of the sides the better protection the outside fruit will have from winds and severe climatic changes.

Practically the pruning of the orange tree consists in removing the branch reaching up and inclosing the center-top and the opening out of the center so that the air and light can freely descend upon and into the cup-top thus produced. This permits the tree to prepare and nourish an inside rim or surface of fruiting wood, and to bear fruit on it. Practically that provides two fruiting surfaces, an outside and inside. The taking out of the top allows more strength to concentrate in the lower sides and they become rich and strong to the ground, so that they not only produce more fruit, but afford their crop more protection by dense side foliage. Thus an increase in both quantity and quality of fruit is effected. But this is still

further augmented by the crop grown inside. This inside crop is as well very superior fruit for packing, as it is protected from the wind, and as well there is always a sufficient thin foliage swinging over the inside rim of the cup to protect from sun-burn.

In such pruning only the saw is required, and care must be exercised to cut all limbs fully back to the eye, and no limb should be nipped or cut on any part of its length or between buds, as in such case it will either die back or sprout like a broom. This method of pruning is not expensive, and can be done very quickly by anyone who can handle a saw properly. It can not be done periodically every few years, but each year the trees should be gone over. The first year it will be found that but one, two or three limbs can be profitably and safely removed.

The next year another limb or two can be removed, until the proper inside shape and healthy fruiting wood is produced. The increase both in quantity and quality of the crop will more than effect the seeming loss of crop suggested by removing the central limbs reaching up into the top.

COPRA DRYING.

In *Tropical Agriculturist* for November, 1910 (Vol. XXXV, No. 5), Mr. J. C. Willis gives an abstract of an article on the drying of copra published in *Der Tropenpflanzer*. It is stated that a mold and darker coloration are caused from the fact that the kernel of the freshly opened nut is wet with coconut milk. Consequently, the first stage of drying requires a fairly high temperature, about 60° to 70° C. or higher. After the outer moisture has disappeared and the flesh is a little dried the temperature may be lowered to 50° and maintained at this until the copra is at least half dry. Then the temperature must be raised again to remove the last moisture and the copra must be cooled in an airy room. Artificial heat is preferable to sun heat and leads to a desirable uniformity in the sample.

Copra drying should be undertaken immediately after the opening of the nuts and should be finished in 24 hours.

Results of experiments in New Guinea show that 4,438 nuts gave a ton of copra, and freshly cut kernels gave 62.7 per cent of dry copra.

MAIZE AS A CATCH CROP.

It is suggested in *Tropical Life* (Vol. VI, No. 11) that the cultivation of maize on rubber estates might be profitable either as a means of preparing the land for planting rubber trees, or as a catch crop between the trees after planting.

In lalang ground maize would be especially suitable as a first crop and only one plowing would be necessary providing it was thoroughly done. While the maize is growing the grass and weeds are decomposing, and after harvesting the crop, the ground is easier to clear. Then too, the maize crop should pay

the expenses of preparing the ground for planting the rubber trees.

Where the plantations have already been started, maize could be grown between the rows of rubber trees and serve as a means of keeping the ground clear of weeds as well as paying part of the expenses of cultivation.

THE DEVELOPMENT OF THE SUGAR INDUSTRY IN HAWAII.

The Bureau of the Census, of the Department of Commerce and Labor, has compiled some interesting data with regard to the manufactures in Hawaii for 1909. The statistics show a large variety of fairly well established industries, but of these the manufacture of sugar is the most important, representing 76 per cent of the total value of products in 1909 and 82 per cent in 1899. It is stated that the decreasing proportion for sugar in 1909 indicates a larger growth in the general manufactures of the Islands.

The number of establishments in 1909 was 46, as compared with 44 in 1899, an increase of 5 per cent. The capitalization increased from ₧15,984,000 in 1899 to ₧29,668,000 in 1909, or 86 per cent. The gross value of products increased from ₧38,510,000 to ₧71,900,000, or 87 per cent. The amount added by manufacturing processes increased from ₧18,954,000 to ₧34,816,000, or 84 per cent.

The following table is a comparative summary of the sugar industry:

Details.	Sugar.		Per cent of increase, 1899 to 1909.
	1909	1899	
Number of establishments	46	44	5
Capital	₧29,668,000	₧15,984,000	86
Cost of materials used	₧37,084,000	₧19,556,000	90
Salaries and wages	₧2,094,000	₧2,224,000	*6
Miscellaneous expenses	₧4,906,000	₧1,242,000	295
Value of products	₧71,900,000	₧38,510,000	87
Value added by manufacture (products less cost of materials)	₧34,816,000	₧18,954,000	
Employees, number salaried officials and clerks	179	385	*54
Average number of wage earners employed during the year	2,517	2,369	6

* Decrease.

MARKET REPORTS.

NOTES ON MANILA MARKETS FOR JANUARY.

By KER & Co.

(Based on advices from London, December 29; New York, December 30; San Francisco, January 3; Hongkong, January 28; Cebu, January 28; Iloilo, January 28.)

SUGAR.

Iloilo.—Freer arrivals and business done in No. 3 for China per picul at first cost; Nos. 1 and 2 have been sold at ₱6.25 and ₱5.90, respectively.

Manila.—Sales made at ₱5.40 per picul, first cost, unclassified, for shipment to China; for other markets ₱5.50 No. 1, ₱5 No. 2, and ₱4.50 No. 3 talked.

Cebu.—No quotation.

HEMP.

Market very dull on account of depressing advices from United Kingdom and United States; we quote fair current for Europe ₱7.25 and for America ₱7.75 per picul, f. o. b. Good current might be bought at ₱15.50 per picul, f. o. b. Receipts at all ports for January are 110,303 bales against 98,811 bales 1910 and 107,343 bales 1909 for the same month.

COPRA.

Weaker and quoted ₱12.03 per picul Manila fair merchantable and ₱13.40 Cebu fair merchantable sun dried, f. o. b.

DISTRIBUTION OF PRINCIPAL PHILIPPINE EXPORTS FOR JANUARY, 1911.

Products exported.	United States.	China.	Pacific Coast.	Great Britain.	Continent of Europe.	Australia.	Japan.	Malay States and India.
Dry sugar (tons) -----		810						
Hemp (bales) -----	43,620	600		32,075	5,882	1,204	1,667	700
Copra (piculs) -----			14,400	2,400	74,976			
Cigars (thousands) -----	385	2,265	556	960	540	105	127	1,156

MANILA AND LONDON FIBER MARKET.

MANILA HEMP.

Arrivals at Manila during January, 1911.

Province.	Piculs.	Bales.
Albay	45,866	22,933
Sorsogon	12,600	6,300
Camarines	20,972	10,486
Leyte	21,856	10,928
Samar	15,812	7,906
Mindanao	12,144	6,072
Other Districts	22,858	11,429
Cebu	9,478	4,739
Total	161,586	80,793

Receipts and shipments.

(Telegram from Manila to London, February 6, 1911.)

	1911	1910
	<i>Bales.</i>	<i>Bales.</i>
Hemp receipts at Manila since January 1	98,340	91,612
Hemp receipts at Cebu, etc., since January 1	37,866	27,405
Hemp receipts at all ports since January 1	136,206	119,017
Shipments to United Kingdom by steamer, cleared since January 1	45,217	22,917
Shipments to Atlantic coast, United States, by steamer, cleared since January 1	56,656	68,536
Shipments to Pacific coast, United States, by steamer, cleared since January 1	10,178	14,987
Shipments to continental ports, by steamer, cleared since January 1	9,082	2,732
Shipments to all other ports	4,771	
Local consumption since January 1	1,000	
Loading steamer on the berth for the United Kingdom about	5,771	5,475
Loading steamer on the berth for Atlantic coast, United States, about	12,000	18,000
		11,000

Bales of hemp loading for United Kingdom, by steamer Kioto (Cebu) 12,000

LONDON QUOTATIONS.

The following quotations on Manila hemp, sisal, and maguey are taken from the Weekly Market Report of Messrs. Landauer & Co., dated London, December 21, 1910, and Messrs. Sloan & Mitchell, of Manila:

Manila hemp.

	Spot and close by (per picul).
Best marks	₹ 26.25-27.50
Good marks	25.00-25.65
Good current	21.88-22.50
25 per cent over current	14.00-14.40
Fair current	12.15-12.50
Superior seconds	12.00-12.10
Good seconds	11.85-12.10
Fair seconds	11.44-11.55
Good brown	11.30-11.44
Fair brown	11.25-11.30
Manila hemp strings	8.75-9.35

SISAL HEMP.

No new feature of interest. The quotation in New York is 4 cents, equal to ₱20 (₱11 per picul) c. i. f. Europe.

MANILA MAGUEY.

More interest has been evidenced in this article, and business for forward shipment has been concluded at ₱10.75 to ₱11 per picul No. 1, ₱9.85 to ₱10 per picul No. 2, and ₱8.90 to ₱9.05 per picul for No. 3. No. 1 maguey was quoted at ₱7 a picul in Manila on December 21.

MANILA QUOTATIONS.

The following are the Manila quotations for abacá, dated December 21, 1910:

Good current	₱16.00
50 per cent over current	13.20
25 per cent over current	9.20
United States current—dull	8.00
United Kingdom current—dull	7.40
Superior seconds—dull	7.20
Good seconds	7.00
Good reds	6.60

ILOILO SUGAR MARKET FOR NOVEMBER, DECEMBER, AND JANUARY.

By FIGUERAS HERMANOS.

Arrivals of the new crop from the sugar mills during November amounted to 15,685 piculs, for December 62,536 piculs, and for January 218,365 piculs. The price during these months was only nominal. For November there was a gradual decline from 5 pesos and 6 reales¹ on the first of the month to 5 pesos and 1 real at the close of the month; during December there was but a slight increase from 5 pesos and 1 real to 5 pesos and 3 reales; during January the price varied but little, the highest quotation for the month being 5 pesos 4½ reales.

¹ 1 real equals 12½ centavos.

November, December, and January shipments.

[In piculs.]

Date.	Vessel.	Destination.	Superior.	Wet.
1910.				
Nov. 3	Sungkiang	Hongkong via Cebu	2,554	
Nov. 13	Tringganu	Cebu (Marseilles, Antwerp)	3,200	
Nov. 20	Dacre Castle	New York	33,600	
Nov. 23	Kweilin	Ningpo, Shanghai, and Chingkiang	29,347	
Nov. 25	Sungkiang	Hongkong	2,737	
Nov. 30	Kaifong	do	886	
	Total for November		72,324	
Dec. 9	Rubi	Cebu	1,154	
Dec. 9	Sungkiang	do	288	
Dec. 15	Kaifong	Hongkong	3,230	
Dec. 18	Zafiro	Manila	2,191	
Dec. 28	Sungkiang	Hongkong	7,195	
Dec. 30	Rubi	do	3,009	
	Total for December		17,067	
1911.				
Jan. 1	Kaifong	Cebu	1,697	
Jan. 8	Zafiro	Manila	9,221	
Jan. 12	Sungkiang	Cebu	1,016	
Jan. 18	Kaifong	Hongkong via Cebu	6,996	29.88
Jan. 22	Rubi	Hongkong via Manila	6,819	
Jan. 29	Zafiro	Manila	6,426	
	Total for January		32,175	29.88

Exports up to February 5, 1911.

[In piculs.]

To—	1909-10 crop.		1910-11 crop.	
	Superior.	Wet.	Superior.	Wet.
United States	18,400		33,600	
China	29,722		98,697	29.88
Total	48,122		132,297	29.88

MANILA RICE MARKET.

The following quotations are taken from the Market Report of Messrs. Sloan & Mitchell, dated Manila, February 9, 1911:

Saigon No. 2 blanco, 125 pounds ^a —firm	₱5.65
Rangoon, per cavan ^b	5.25
Pangasinan milled, per cavan—quiet	5.80
Second white, per cavan—quiet	5.65

^a 56.6 kilos.^b 1 cavan equals 75 liters.

PRINCIPAL PHILIPPINE IMPORTS AND EXPORTS DECEMBER, 1910, AND JANUARY, 1911.

By the INSULAR COLLECTOR OF CUSTOMS.

DECEMBER, 1910.

IMPORTS.

Articles.	Units.	Manila.	Cebu.	Iloilo.	Jolo.	Zamboanga.	Balabac.	Total.
Rice	Quantity Value	18,047,948 614,850	5,578,702 208,405	2,247,761 71,316	75,730 2,972	210,308 7,904	1,050 51	26,161,598 900,498
Beef cattle.	Quantity Value	2,159 248,560	5,466 15,393	1,953 15,393	14 7,503	14 10,697	318 26	4,126 287,937
Sugar	Quantity Value	15,292 18,034	1,882 1,483	1,085 1,146	456 560	684 2,182	26	27,895 23,885
Coffee	Quantity Value	2,566 54,669	1,872 8,629	1,436 110	160	682	---	7,166 63,408
Cacao	Quantity Value	14,053 305,447	2,638	92	---	339	---	16,783 306,175
Eggs	Quantity Value	26,146	---	44	---	23	---	26,213
Raw cotton	Quantity Value	---	---	---	---	---	---	---

EXPORTS.

Hemp	Quantity Value	12,374,779 1,159,866	2,057,086 215,075	---	8,253 655	---	---	14,440,118 1,375,596
Copra	Quantity Value	10,514,218 879,654	2,729,988 260,650	---	109,505 9,307	193,063 16,285	1,418 85	13,548,192 1,165,381
Sugar	Quantity Value	12,667 414	---	912,564 41,209	---	---	---	1,925,231 41,623
Cigars	Quantity Value	18,012 135,802	---	---	---	---	---	13,012 135,802
Cigarettes	Quantity Value	2,390 2,005	---	---	---	---	---	2,390 2,005
Tobacco	Quantity Value	1,294,346 226,819	---	---	---	---	---	1,294,346 226,819

JANUARY, 1911.

IMPORTS.

Articles.	Units.	Manila.	Cebu.	Iloilo.	Total.
Rice.....	{Quantity {Value	5,002,148 169,814	894,387 24,827	1,341,014 42,407	7,167,549 237,048
Beef cattle.....	{Quantity {Value	2,870 51,512	200 6,500	140 2,671	3,210 60,983
Eggs.....	{Quantity {Value	380,520 31,328	54 3	242 27	380,816 31,360
Sugar.....	{Quantity {Value	23,364 122,967	22,688 1,827	27,250 1,869	293,437 28,060
Coffee.....	{Quantity {Value	132,986 33,358	2,584 138,155	54 123,169	138,608 138,608
Cacao.....	{Quantity {Value	39,142 23,352	20,431 5,990	22 7	45,099 23,352
Raw cotton.....	{Quantity {Value	7,309			7,309

MARCH, 1911.

EXPORTS.

Hemp.....	{Quantity {Value	11,076,577 1,059,198	3,092,770 330,061		14,169,347 1,389,259
Copra.....	{Quantity {Value	5,247,940 478,857	926,720 84,280	98,750 9,547	6,274,410 3,572,684
Sugar.....	{Quantity {Value	1,219,404 49,068		2,379,896 101,974	3,599,300 151,042
Cigars.....	{Quantity {Value	7,200 88,975		7,200 88,975	7,200 88,975
Cigarettes.....	{Quantity {Value	2,978 3,466		2,978 3,466	2,978 3,466
Tobacco.....	{Quantity {Value	1,042,227 162,477			1,042,227 162,477

TEMPERATURE AND RAINFALL FOR AGRICULTURAL DISTRICTS IN THE PHILIPPINES.

By the DIRECTOR OF THE WEATHER BUREAU.

JANUARY, 1911.

[Temperature and total rainfall for twenty-four hours beginning at 6 a. m. each day.]

Date.	Hemp.				Sugar, Iloilo.		Rice, Tarlac.		Tobacco.			
	Albay.		Tacloban.		Temperature.	Rainfall.	Temperature.	Rainfall.	Aparri.		San Fernando.	
	Temperature.	Rainfall.	Temperature.	Rainfall.					Temperature.	Rainfall.	Temperature.	Rainfall.
	°C.	mm.	°C.	mm.	°C.	mm.	°C.	mm.	°C.	mm.	°C.	mm.
1	24.6	3.6	25.6	6.9	25.2	0.3	25.2	mm.	23.7	25.2	25.2	0.8
2	25.6	---	25.4	---	25.1	---	26	---	23.7	17.7	25.2	---
3	25.8	30.2	25	.5	24.6	---	25.2	---	22.5	12.2	24.6	---
4	24.6	22.5	26.1	1	25.6	.5	26	---	23.6	1.5	24.6	---
5	25.5	3.8	26.6	---	26.5	---	27.7	---	24.6	4.3	25.6	---
6	26.4	2.1	26	19	26.4	---	28.7	---	23.7	.3	26.2	---
7	26.2	8.9	25.6	31.1	26.1	6.1	24.8	---	23.1	.3	25.2	---
8	25.6	35.6	25.2	5.1	24.7	.3	25.2	---	23.3	---	24.1	---
9	25.3	12.5	26.6	---	26.6	---	25.9	---	23.4	---	23.9	---
10	25.1	---	26.5	---	26.9	---	27	---	23.6	10.7	25.6	---
11	25.2	---	26.5	---	26.1	---	28.5	---	22.8	67.4	25.4	---
12	24.7	---	26.5	---	25.8	---	27.3	---	21.7	19.4	24.8	---
13	24.5	11.7	25.6	5.6	26.3	---	26.7	---	20.9	8.9	25	---
14	26.4	---	26.6	---	26.9	---	27.4	---	22.9	4.6	25	---
15	25.8	---	26.8	---	27	---	27	---	21.8	21.8	25.9	---
16	26.2	---	26.6	---	26.8	---	(*)	---	21.3	39.6	25.8	---
17	26.8	---	27.1	---	26.8	---	---	---	21.6	2.6	25	---
18	26.2	4.6	25.3	2.3	26.6	---	---	---	22.9	17.9	21.2	---
19	25.7	.3	26.9	---	26.2	---	---	---	22.4	11.7	24.2	---
20	26.4	---	25.3	4.9	26	---	---	---	22	21.8	24.6	---
21	26.2	23.3	26.4	1.5	26.3	---	---	---	23	---	24.3	---
22	25.4	1	26.4	---	26.4	.5	---	---	23.4	25.6	25.4	---
23	24.8	.3	25.9	.8	26.2	---	---	---	22.4	15.5	25.2	---
24	24.8	---	26.9	1.3	26	---	---	---	23	---	24.7	---
25	25.5	---	26.2	1	26.1	---	---	---	22.1	---	24.8	---
26	26.2	1.5	27.1	---	27	---	---	---	23.3	---	25.6	---
27	25.7	---	27.2	---	26.8	.3	---	---	24.2	---	25.5	---
28	26.2	---	26.8	3.3	26.8	---	---	---	24.6	---	24.4	---
29	26.8	6.1	26.6	---	26.9	---	---	---	24.8	---	25.6	---
30	25.9	.8	26.6	---	26.6	---	---	---	24.8	---	25.4	---
31	26.7	---	27.5	---	27	---	---	---	25.3	---	27	---

*The fire on January 29 destroyed part of the instruments and all the records of this station.

CROPS PLANTED AND HARVESTED AND CONDITION OF SAME TAKEN FROM QUARTERLY CROP REPORTS FOR THE QUARTER ENDING SEPTEMBER 30, 1910.

[NOTE.—Attention is invited to the fact that rice should be understood as being in the unhulled state. 75 liters=1 cavan; 63.25 kilos=1 picul; 46 kilos=1 quintal; 11.5 kilos=1 arroba; 0.4047 hectare=1 acre.]

Province and crop.	Condition.	Planted during quarter.	Harvested during quarter.		
			Area.	Quantity.	Unit.
Agusan:		Hectares.	Hectares.		
Rice	Fair	61	373	264,900	Liters.
Abaca	Good	123		64,072	Kilos.
Corn	do	58	19	14,775	Liters.
Albay:					
Rice	do	6,211	85	56,400	Do.
Abaca	do	346	14,491	3,197,224	Kilos.
Copra	do			209,357	Do.
Sugar cane	do	53	99	48,702	Do.
Corn	Fair	71	361	196,500	Liters.
Ambos Camarines:					
Rice	Good	8,153	72	21,600	Do.
Abaca	do	185	10,280	1,747,155	Kilos.
Copra	do			210,053	Do.
Sugar cane	do	49	90	44,971	Do.
Corn	do	16	262	175,750	Liters.
Antique:					
Rice	Fair	11,949	763	700,725	Do.
Abaca	Good	24	69	17,900	Kilos.
Copra	do			6,198	Do.
Corn	do		334	132,600	Liters.
Coffee	do	16	1	57	Kilos.
Bataan:					
Rice	Fair	5,536			
Corn	do	108	125	80,775	Liters.
Batangas:					
Rice	do	783	8,896	4,763,025	Do.
Abaca	Good	7	311	51,800	Kilos.
Copra	Fair			6,325	Do.
Corn	do	25	4,903	2,696,175	Liters.
Coffee	do	29			
Bohol:					
Rice	do	12,133	420	550,500	Do.
Abaca	do	18	806	267,358	Kilos.
Copra	Good			757,355	Do.
Sugar cane	do	39	139	124,160	Do.
Corn	Fair	2,380	5,619	5,207,875	Liters.
Bulacan:					
Rice	do	35,665	933	143,100	Do.
Sugar cane	Good		77	106,197	Kilos.
Corn	Fair	10	2,430	1,567,500	Liters.
Coffee	do				
Cacao	do				
Cagayan:					
Rice	do	3,607	1,089	800,100	Do.
Sugar cane	do	17	10	3,668	Kilos.
Corn	do	705	5,679	5,712,105	Liters.
Tobacco	do	79			
Capiz:					
Rice	do	26,400	8,618	11,832,975	Do.
Abaca	do	58	467	160,275	Kilos.
Copra	do			403,598	Do.
Sugar cane	do	62	35	14,990	Do.
Corn	do	155	1,176	763,250	Liters.
Cavite:					
Rice	do	10,451	3,563	2,489,250	Do.
Abaca	Good	160	800	318,970	Kilos.
Copra	do			20,872	Do.
Sugar cane	do	63			
Corn	Fair	27	911	715,125	Liters.

Crops planted and harvested, etc.—Continued.

Province and crop.	Condition.	Planted during quarter.	Harvested during quarter.		
			Area.	Quantity.	Unit.
Cebu:		<i>Hectares.</i>	<i>Hectares.</i>		
Rice	Fair	1,421	961	1,108,875	Liters.
Abacá	Good	301	2,374	515,551	Kilos.
Copra	do			748,627	Do.
Corn	Fair	15,982	33,640	24,967,050	Liters.
Maguey	Good	157	563	111,636	Kilos.
Tobacco	Fair		374	399,740	Do.
Ilocos Norte:					
Rice	do	60,378	62	175,500	Liters.
Corn	do		935	764,325	Do.
Tobacco	do		294	249,913	Kilos.
Coffee	do	81	7	1,679	Do.
Cacao	do	100	18	1,587	Do.
Ilocos Sur:					
Rice	do	38,461	28	12,450	Liters.
Sugar	Good				
Corn	Fair	40	1,766	901,200	Liters.
Maguey	Good	11	12	10,589	Kilos.
Cacao	Fair	10	2	69	Do.
Iloilo:					
Rice	do	38,471	983	713,625	Liters.
Abacá	Good	15	438	79,442	Kilos.
Copra	do			49,145	Do.
Sugar cane	do	52			
Corn	Fair	474	4,799	2,766,225	Liters.
Isabela:					
Rice	do	25	12	900	Do.
Corn	do	4,734	11,110	14,210,100	Do.
La Laguna:					
Rice	do	5,188	1,089	2,146,650	Do.
Abacá	Good	7	313	170,838	Kilos.
Copra	do			1,276,764	Do.
Sugar cane	do	7	11	7,590	Do.
Corn	Fair	85	235	350,700	Liters.
La Union:					
Rice	do	31,434			
Copra	do			45,097	Kilos.
Sugar cane	do	123			
Corn	do	20	818	456,900	Liters.
Coffee	do	8			
Leyte:					
Rice	Good	8,250	2,374	2,878,650	Liters.
Abacá	Fair	3,114	16,493	5,466,255	Kilos.
Copra	Good			1,028,445	Do.
Sugar cane	Fair	106	250	348,507	Do.
Corn	do	1,861	3,784	2,722,650	Liters.
Tobacco	Good	286	1,446	379,960	Kilos.
Mindoro:					
Rice	Fair	2,413	451	239,775	Liters.
Abacá	Good	24	554	142,818	Kilos.
Copra	do			6,451	Do.
Sugar cane	Fair		11	5,756	Do.
Corn	do	2	279	184,200	Liters.
Misamis:					
Rice	do	662	660	418,500	Do.
Abacá	do	45	2,197	342,815	Kilos.
Copra	Good			160,212	Do.
Sugar cane	do	10	16	7,969	Do.
Corn	Fair	235	1,581	1,652,850	Liters.
Moro:					
Rice	do	1,996	431	204,225	Do.
Abacá	Good	441	2,894	1,674,797	Kilos.
Copra	do			117,139	Do.
Sugar cane	do	42	159	98,823	Do.
Corn	Fair	260	326	262,700	Liters.
Mountain:					
Rice	Good	8,847	1,031	1,669,125	Do.
Sugar cane	Fair	4	4	1,518	Kilos.
Corn	do	5	727	469,950	Liters.
Coffee	do	39	26	1,472	Kilos.
Cacao	do	2	16	552	Do.
Nueva Ecija:					
Rice	Good	66,965	5	3,750	Liters.
Sugar cane	do	8	10	6,957	Kilos.
Corn	Fair	9	1,259	1,122,825	Liters.
Tobacco	do		180	16,560	Kilos.

Crops planted and harvested, etc.—Continued.

Province and crop.	Condition.	Planted during quarter.	Harvested during quarter.		
			Area.	Quantity.	Unit.
Nueva Vizcaya:		<i>Hectares.</i>	<i>Hectares.</i>		
Rice	Good	2, 478			
Sugar cane	do	1	40	25, 173	Kilos.
Corn	do	15	110	84, 525	Liters.
Coffee	Fair	1	3	230	Kilos.
Occidental Negros:					
Rice	do	14, 482	408	420, 000	Liters.
Abacá	Good	245	390	108, 727	Kilos.
Copra	do			287, 851	Do.
Sugar cane	do	941	815	1, 074, 997	Do.
Corn	Fair	1, 196	2, 643	2, 847, 450	Liters.
Oriental Negros:					
Rice	do	1, 112	525	668, 250	Do.
Abacá	do	155	2, 577	1, 285, 177	Kilos.
Copra	Good			262, 424	Do.
Sugar cane	Fair	365	5	3, 795	Do.
Corn	do	2, 907	9, 187	6, 666, 000	Liters.
Palawan:					
Rice	Good	888	960	1, 173, 400	Do.
Copra	do			43, 706	Kilos.
Corn	Fair		136	102, 450	Liters.
Pampanga:					
Rice	do	51, 429	1, 330	1, 293, 975	Do.
Sugar cane	Good				
Corn	Fair		1, 970	2, 656, 350	Do.
Pangasinan:					
Rice	Good	123, 592	231	75, 975	Do.
Copra	do			157, 113	Kilos.
Sugar cane	do	3	25	94, 369	Do.
Corn	Fair	366	4, 937	2, 605, 875	Liters.
Tobacco	do		55	6, 026	Kilos.
Coffee	do	6	9	437	Do.
Rizal:					
Rice	do	12, 025	200	709, 950	Liters.
Sugar cane	do	53	11	7, 400	Kilos.
Corn	do	138	631	374, 925	Liters.
Samar:					
Rice	do	3, 834	1, 027	1, 033, 125	Do.
Abacá	Good	3, 467	4, 567	2, 283, 388	Kilos.
Copra	Fair			973, 038	Do.
Sugar cane	do	392	286	220, 905	Do.
Corn	Good	137	962	773, 100	Liters.
Tobacco	Fair	4	63	14, 490	Kilos.
Sorsogon:					
Rice	do	672	6	3, 975	Liters.
Abacá	Good	209	38, 938	7, 053, 893	Kilos.
Copra	Fair			286, 522	Do.
Sugar cane	do	35	183	114, 482	Do.
Corn	do	110	1, 878	519, 000	Liters.
Tobacco	Good		14	10, 534	Kilos.
Surigao:					
Abacá	Fair	36	1, 744	679, 052	Do.
Copra	Good			160, 339	Do.
Sugar cane	do	23	30	16, 382	Do.
Corn	do	1, 005	554	605, 250	Liters.
Tobacco	Fair	4	16	4, 508	Kilos.
Tarlac:					
Rice	do	57, 100	54	7, 500	Liters.
Sugar cane	do				
Corn	do		99	139, 290	Do.
Tayabas:					
Rice	Good	9, 141	382	490, 050	Do.
Abacá	do	30	878	515, 520	Kilos.
Copra	Fair			3, 407, 214	Do.
Sugar cane	Good	77	287	182, 476	Do.
Corn	Fair	102	177	85, 500	Liters.
Tobacco	do	5	58	38, 686	Kilos.
Zambales:					
Rice	do	12, 375	8	22, 875	Liters.
Copra	do			949	Kilos.
Corn	do		61	33, 875	Liters.
Cacao	Good	225			
Maguey	do	20	9	10, 436	Kilos.

NOTE.—Statistics are kept of number of coconut trees, so the number of hectares harvested can not be shown.

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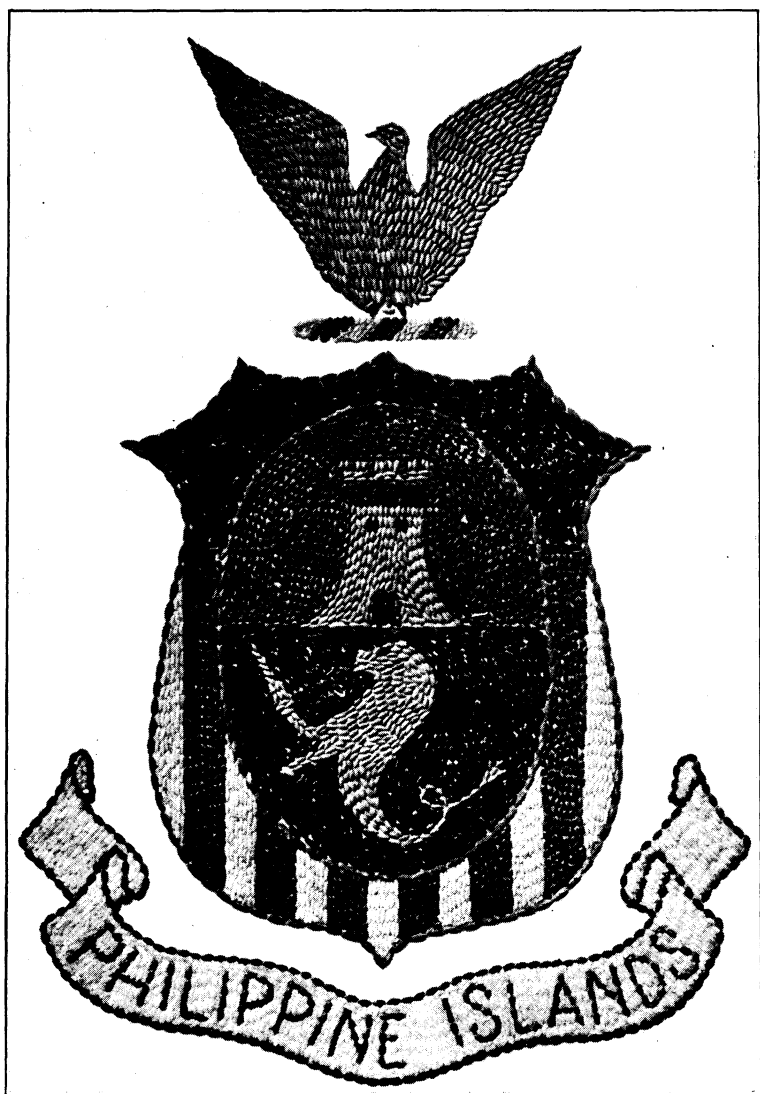


PLATE I.—COAT OF ARMS OF THE PHILIPPINE ISLANDS MADE FROM
DIFFERENT VARIETIES OF RICE RAISED IN
THE PHILIPPINES.

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CARNIVAL NUMBER



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EDITORIAL.

THE REVIEW AND THE CARNIVAL.

The first number of the PHILIPPINE AGRICULTURAL REVIEW was published in January, 1908, and in February of the same year the first Philippine Carnival was held in the city of Manila. During the past three years considerable space in the REVIEW has been devoted to the Carnival, and the March, 1910, number was issued as a special "Carnival Number." We believe that the Carnival exerts a decided influence for good on the agricultural interests of these Islands and that, in so far as it is an industrial exposition, there should be this permanent record published and distributed each year. For this reason the present number of the REVIEW is devoted largely to articles descriptive of the agricultural and other industrial features of the 1911 Carnival.

THE CARNIVAL AS A FACTOR IN AGRICULTURAL DEVELOPMENT.

At each succeeding Carnival during the past four years an increasing amount of attention has been given to the industrial, and more particularly the agricultural, exhibits. Inasmuch as the preparation of these exhibits now requires each year a large amount of time and effort, and entails the expenditure of a considerable sum of money, it seems desirable to determine, in so far as it may be possible to determine, the actual results obtained by this work. Do the agricultural exhibits at the Carnival have any effect on the improvement of agricultural conditions in these Islands, and if so, in what way?

That which has contributed more than any other one thing to the improvement of agricultural conditions throughout the world has been the development of suitable means for disseminating information among the farmers. For many decades specialists and investigators have been gathering together a vast fund of information pertaining to agriculture, but it is only in very recent years that this information has been so presented to the people who are actually working the farms as to be instrumental in the production of larger and better crops. In the Philippine Islands an important and difficult problem is to bring to the attention of the farmers in a simple and yet forceful manner the need for improved methods of work and the means by which such methods can be put into practice. In this respect the Carnival exhibits and the exhibits at the provincial expositions, which may be considered as an outgrowth

of the Carnival, can not fail to exert an important influence. Included in these exhibits are the best specimens that can be obtained of all the important agricultural products of the Islands. By means of the exhibits, therefore, persons interested in agriculture are shown what results can be obtained by the use of improved methods. While it is not practicable to demonstrate to any considerable extent at the Carnival what these methods are, information regarding them can always be obtained from persons in charge of the exhibits.

A second feature of the Carnival exhibits is that they stimulate a spirit of healthy competition. This was very plainly shown at the last Carnival, where every possible effort was exerted by a large number of provinces to prepare exhibits superior to those of other competing provinces. There can be no question but that this spirit of competition will be productive of beneficial results. The person who has once taken an interest in furnishing superior articles for an exhibit will naturally, in course of time, seek to produce such superior products for his own consumption and sale.

At the present time there is a most unfortunate lack of coöperation among the farmers of these Islands. In many localities, especially in the sugar-producing provinces, conditions might be greatly improved if some scheme of effective coöperation could be established. In this respect the preparation of exhibits for the Carnival may well have an important effect in that it is a united effort to accomplish a certain definite end. The people who contribute to these exhibits are not doing something that is to give them any direct gain or personal reward, but rather something that is to reflect credit on their municipality or province. This work is essentially coöperative, and the idea of coöperation started in this manner may well be extended to industrial and business operations.

Other considerations of minor importance might be mentioned whereby the Carnival exerts an influence for the betterment of the present agricultural situation. It is believed, however, that if this influence were restricted to the three lines above mentioned, namely, educational, competitive, and coöperative, that the time, the money, and the effort that are now expended in the preparation of the Carnival exhibits would be amply justified.

THE SECOND ANNUAL LIVE-STOCK EXHIBIT AT THE CARNIVAL.

By C. W. EDWARDS, *Agricultural Inspector.*

The Carnival live-stock and poultry exhibit this year was successful to a degree exceeding even the anticipations, of the most optimistic. The number of entries and the quality of stock exhibited would compare very favorably with many of our home county shows that are the result of years of endeavor and experience. Taking into consideration the fact that this was only the second exhibit of its kind ever held in the Philippine Islands and noting the great progress made in one year, the prospects for future live-stock shows look very promising indeed.

Although many of the animals exhibited were not what would be considered in show shape, they conveyed to the observer a truer conception of their real value than they would have had they been kept for some time under highly artificial conditions. Among the many obstacles encountered in preparing this exhibit were the fear of exposure of animals to infectious diseases; lack of sufficient time to put them in show condition; general uncertainty due to lack of accommodations and failure to grant substantial prizes at last year's exhibit; and the fact that the venture was still a novelty. The inducements offered by the Bureau of Agriculture, consisting of suitable quarters, free feed and attendants for animals while on exhibition, and the promise of cash prizes, aided wonderfully in overcoming these obstacles and made it possible to arouse the enthusiasm of the live-stock owners of the Islands. In the future it is intended to add to these inducements, especially in the way of larger prizes, until the stock breeders of the Islands will not only be willing but eager to enter their animals in this exposition.

A new feature of the show, instituted this year, was the auction sale, held on Monday, February 27, at the Carnival grounds. Although the attendance was small and but few private animals were sold, this event should, and probably will, become a prominent and permanent annual feature. The Bureau of Agri-

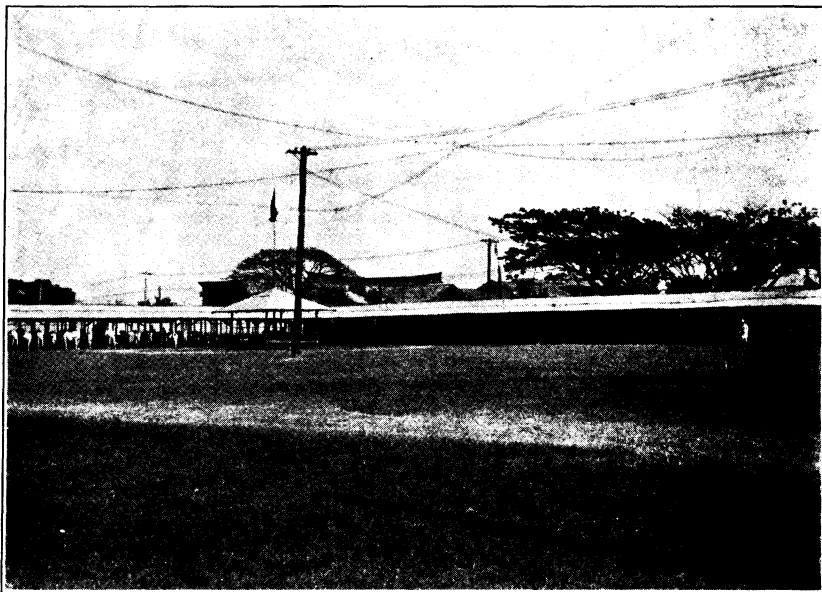


PLATE II.—(a) GENERAL VIEW OF BUILDINGS FOR THE LIVE-STOCK EXHIBIT
AT THE CARNIVAL.

This exhibit covered a floor space of 1,114.8 square meters.



PLATE II.—(b) POULTRY EXHIBIT AT THE CARNIVAL.

This exhibit covered a floor space of 250 square meters.

culture disposed of, among other animals, a number of fine young Arab and American-mestizo stallions, Nellore bulls, and Berkshire pigs. The total receipts from this sale amounted to ₱5,948. Five per cent of this amount was distributed as prize money. The Government animals that won places were awarded no cash premiums, the prizes in each instance being given to the next best animal not belonging to the Government.

HORSE DIVISION.

In the horse division there were ten exhibitors with a total of thirty-five entries. The imported coach class contained only German coach mares, exhibited by Señor S. P. Sy Quia. Fourteen entries made up the light harness class. Thoroughbreds, standard-bred trotters, and high-class grades were shown. Among the imported ponies under 14 hands there were the Welsh and thoroughbreds, together with a novel exhibit of diminutive Cochin China ponies, the property of Señor Faustino Lichauco. The department of sanitation and transportation of Manila presented a very creditable exhibit in the class of foreign breeds native bred. Among the number was the beautiful stallion "Handmoyle," sired by the Bureau of Agriculture stallion "Hand-rail." The foreign-native crosses constituted the largest class, with the Bureau of Agriculture leading in the number of entries. Among the twenty head of colts entered many different crosses were represented—the offspring from native sires by American dams, and Morgan, thoroughbred, and Arab sires by native dams. The up-grading of the Filipino pony is of paramount importance to this country, consequently these crosses offered a very interesting and instructive study in determining the breed best suited for the work. The superior quality, conformation, and action of the Bureau's two and three year old Arab mestizos made them general favorites with the many visitors and offered a strong argument in favor of the use of the Arabian sire for crossing on native mares. Although few native ponies were entered, this class contained some rare 54-inch specimens, together with a few ponies of the racing-type. Señor Gochuico had the largest number of entries in this class.

CATTLE DIVISION.

In this division there were twenty-one entries representing seven distinct breeds, in addition to a number of fine two-year-old Nellore bulls and bullocks exhibited by the Bureau of Agriculture and sold at the public auction. The Galloway, Angus, Hereford, and Shorthorn breeds constituted the bulk of the imported beef breed section. Señor Alberto Sisi showed some fine

specimens of the Shorthorn breed and the Bureau of Agriculture some good Hereford, Galloway, and Angus aged bulls. In the imported dairy class, the Ayrshire, Shorthorn (milking strain), and Red Poll cows from the Vaqueria de Español were typical representatives of their respective breeds and superior to the average dairy animal found in the Philippines. Señor M. Prieto exhibited two Jersey heifers and Señor Reyes one grade bull and cow. The Chinese, Indo-Chinese, and Nellore constituted the bulk of the section occupied by the imported draft breed. The Bureau's Nellore herd formed an attractive exhibit in this class. The Bureau of Agriculture was the only large exhibitor in the class of foreign-native crosses. The herd consisted mostly of calves, products of the first cross from the Angus, Galloway, and Nellore sires on Chinese and native dams, together with two fine three-year-old Galloway-Chinese grade bulls. These grades or half-breeds were not given any extra preparation for this exhibit, but taken directly from the range. For the production of a beef type animal no other breed so far introduced has proven as satisfactory as have the Galloway and Angus. Sires of these breeds when crossed upon the native stock produce an animal of good beef conformation and one that possesses the characteristic of adaptability to the conditions of this country. Until sufficient hardy forage grasses are introduced and grown successfully here the products from the infusion of pure blood, in order to be of any great value to the Filipino farmer, must be able to subsist upon the native pastures under natural conditions. The Nellore-Chinese grade calves look very promising. One would expect this cross to produce a very good type of work animal, as the Chinese dam should give the offspring body while the sire side should give sufficient height and possibly transmit to its offspring the Nellore's low susceptibility to rinderpest.

CARABAO DIVISION.

The section of imported carabaos contained a rare group of Indian milk carabaos and grades exhibited by Señor Mariano Molo, of Pasay. There are but few specimens of this breed in the Islands, and very little experimenting has been attempted in crossing them with other breeds.

SWINE DIVISION.

The only large exhibitor of swine other than the Bureau of Agriculture was Mr. E. Wickham. His contribution consisted of pure bred Berkshires, together with a number of mestizo pigs. Perhaps the most interesting part of this exhibit was a large sow of the type found upon the Jalajala estate with ten fine

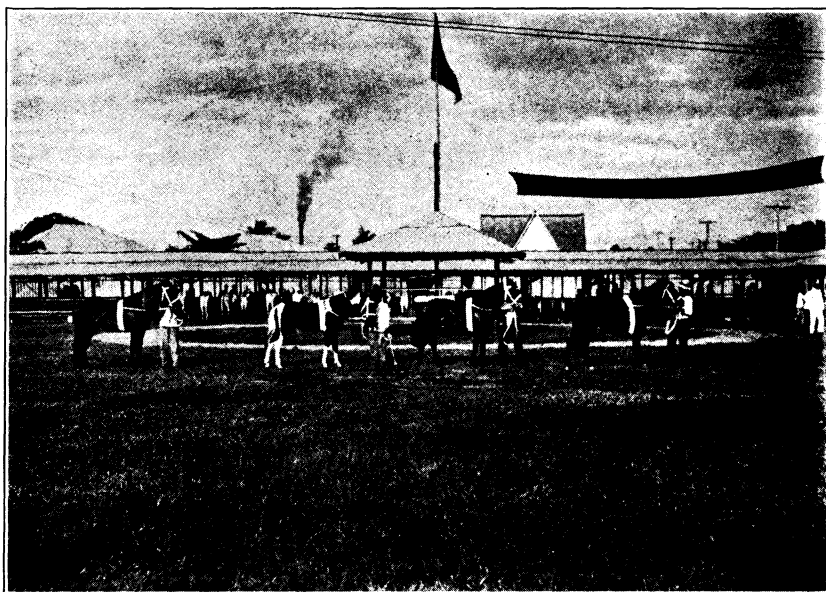


PLATE III.—(a) MESTIZO STALLIONS BRED BY THE BUREAU OF AGRICULTURE.

From left to right: (1) Product of native sire and American dam; (2) Arab sire and native dam; (3) native sire and American dam; (4) American sire and native dam.

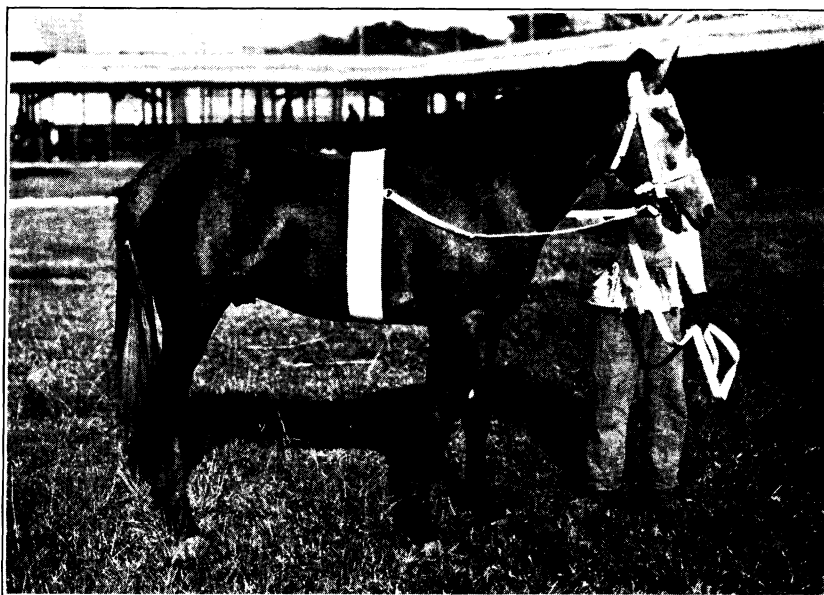


PLATE III.—(b) ARAB-NATIVE MESTIZO STALLION "BEDER JUNIOR." SIRE, ARAB STALLION "BEDER;" DAM, NATIVE MARE.

This colt is typical as showing the excellent type resulting from crossing the Arabian stallion on native mares.

quarter-blood Berkshire pigs. Owing to its size this native type makes a very desirable cross with pure breeds. The Bureau exhibited, besides pure blood Berkshires from Alabang, six fine individuals of this breed recently imported from New Zealand. The specimens exhibited in this division indicate that none of the native domestic animals respond as readily and satisfactorily to the infusion of pure blood as the native swine. The results from the first cross are superior to what would ordinarily be expected.

GOAT DIVISION.

This division contained Spanish and Maltese pure breeds, grades, and natives.

POULTRY DIVISION.

No doubt the greatest success of the entire exhibit was realized in this division. The result of the efforts to institute an up-to-date poultry show was a revelation to even those having the work in charge. The common remark heard from the average observer was to the effect that they did not realize there were so many pure bred fowls in the Islands. This show demonstrated that there is a keen interest being taken in the poultry-raising industry and would seem to indicate that the time is now ripe for the forming of a good active poultry association among the many Manila fanciers. If this industry develops as it should, in a few years Manila will not be importing eggs and poultry commercially from other countries. The entries represented seventeen different breeds and many crosses—Barred Plymouth Rocks, Buff Orpingtons, Silkies, Rhode Island Reds, Black Orpingtons, Black Langshans, Indian Game, Silver Laced Wyandottes, White Wyandottes, Light Brahmas, Dark Brahmas, Black Minorcas, Andalusians, American and Australian White Leghorns, Bantams, and native games. The largest number of entries appeared among the Barred Plymouth Rocks, Light Brahmas, and White Leghorns; the largest exhibitors were Señor Juan Teus, Capt. George Seaver, Mrs. A. J. Neal, and Capt. William Wolfert. One very interesting and promising feature of the show was the fine exhibits made by the Santa Cruz, Zurbaran, Pandacan, and Sampaloc Schools. These exhibits were indicative of the results accomplished by Mrs. A. J. Neal in her efforts to introduce poultry raising in the grade schools of Manila. There is no reason why poultry raising should not become one of the important industrial subjects in the curriculum of the Philippine schools. Much credit for the success of this year's poultry exhibit is due Mr. E. M. Schervenka and Mrs. A. J. Neal.

The importance of animal husbandry to the Philippines can not be overestimated. The enormous amounts of money expended each year in the importations of beef and work animals is only one of the many examples showing the necessity of increased interest and activity along this line. One of the most potent and useful factors in the furthering of this industry is the live-stock exhibit, for by this means not only is the spirit of competition aroused, but opportunity is offered for those interested to study the various pure breeds and their crosses and thus determine the particular type best suited to their conditions and needs.

As previously mentioned the obstacles encountered in preparing this exhibit are numerous, but these will gradually be overcome by offering greater inducements. In the future, with the assurance to prospective exhibitors of substantial prizes in addition to suitable accommodations, the live-stock show bids fair to become one of the leading events of the year.

Judges of the various divisions were as follows:

Horses: Señor M. Prieto, Mr. C. D. Squires, and Doctor Hill.

Cattle: Mr. W. N. Birch and Dr. J. A. Thomson.

Carabaos and swine: Mr. José Nieva.

Poultry: Mr. Charles F. Preusser and Mr. E. M. Schervenka.

Following is a list of prize winners:

HORSES.

Imported coach: Señor P. Sy Quia.

Imported light harness: Bureau of Agriculture, Mr. Frank Button, Australian Horse Bazaar.

Imported ponies under 14 hands: Mr. John Giloy, Australian Horse Bazaar, Señor Faustino Lichauco.

Foreign breeds native bred: Department of Sanitation and Transportation, Bureau of Agriculture.

Foreign native cross: Bureau of Agriculture, Señor José Aldecoa.

Native horses: Australian Horse Bazaar, Señor C. Gochuico, Señor P. Sy Quia, Bureau of Agriculture.

CATTLE.

Imported beef breeds: Bureau of Agriculture, Señor Alberto Sisi.

Imported dairy breeds: Señor Alberto Sisi.

Imported draft breeds (Chinese or Indo-Chinese): Bureau of Agriculture.

Imported draft breeds (Indian): Bureau of Agriculture.

Foreign breeds native bred: Señor Alberto Sisi, Bureau of Agriculture.

Foreign native cross: Bureau of Agriculture.

CARABAOS.

Imported (Indian): Señor Mariano Molo.

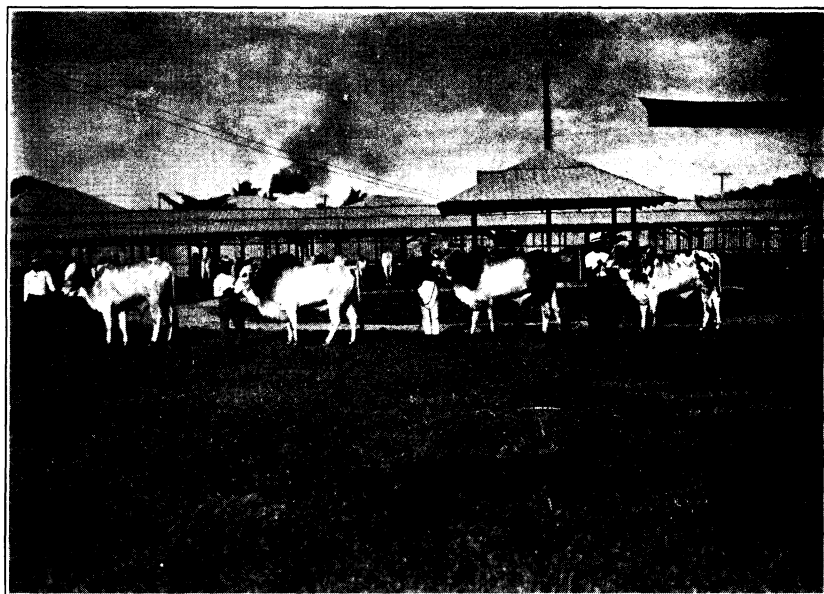


PLATE IV.—(a) EXHIBIT OF TWO-YEAR-OLD NELLORE BULLS SOLD AT PUBLIC AUCTION BY THE BUREAU OF AGRICULTURE.

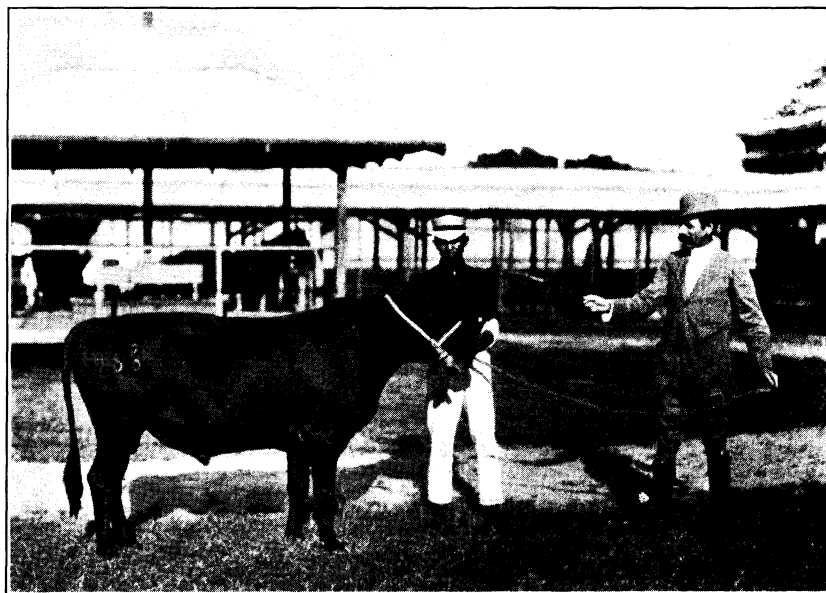


PLATE IV.—(b) GALLOWAY-CHINESE THREE-YEAR-OLD BULL.

SWINE.

Imported: Bureau of Agriculture and Mr. E. Wickham.

Foreign native cross: Mr. E. Wickham.

Native: Bureau of Agriculture.

Foreign breeds native bred: Bureau of Agriculture.

POULTRY AND PIGEONS.

Barred Plymouth Rocks: Juan Teus, Mrs. A. J. Neal, N. T. Hashim.

Foreign native cross (Game): Silvestre de Jesus.

Silkies: Mrs. A. J. Neal, Santa Cruz Primary School.

Rhode Island Reds: Santa Cruz Advanced Primary School, Mrs. A. J. Neal.

Black Orpingtons: Mrs. A. J. Neal, Santa Mesa School, N. T. Hashim.

Black Langshans: Miss Fannie McGee.

Indian Game: Juan Teus.

Native cross: J. Graham.

Silver Laced Wyandottes: Zurbaran School.

White Wyandottes: Juan Teus.

Buff Orpingtons: Juan Teus, N. T. Hashim.

Light Brahmas: Juan Teus.

Dark Brahmas: Juan Teus.

Imported native cross: Capt. William Wolfert.

Black Minorcas: Juan Teus.

Andalusians: Juan Teus.

American White Leghorns: Capt. George Seaver, Pandacan School.

Australian White Leghorns: Capt. George Seaver, N. T. Hashim.

Best all round display of poultry, Juan Teus.

Best display of American White Leghorns, Capt. George Seaver.

Best display of Australian White Leghorns, Capt. George Seaver.

Best display of Barred Plymouth Rocks, Mrs. A. J. Neal.

Best school display: Third district, first prize—Mrs. A. J. Neal, supervisor.

Best school display: First district, second prize—Miss Fannie McGee, supervisor.

THE PROVINCIAL EXHIBITS AT THE CARNIVAL.

By E. A. CODDINGTON, *Superintendent of Publications.*

Last year marked the beginning of a much larger interest on the part of the provinces in the exhibit of agricultural and industrial products at the Carnival. Ten provinces presented very creditable exhibits, but of these provinces three, Rizal, Albay, and Cebu, were not represented this year. However, the interest in the exposition greatly increased during the year and sixteen provinces, namely, Samar, Cavite, Bulacan, Ilocos Norte, Tarlac, Union, Iloilo, Pampanga, Bohol, Occidental Negros, Mindoro, Pangasinan, Misamis, Ilocos Sur, Surigao, and the Moro Province, were represented at the Carnival of 1911. Nine of these provinces, Ilocos Sur, Union, Tarlac, Cavite, Mindoro, Samar, Occidental Negros, Bohol, and Surigao, were not represented at the Carnival of 1910. The exhibits consisted largely of the agricultural and industrial products of the provinces and were not only a credit to the people, but much more representative and arranged in better order for exhibition than any similar exhibit at the Carnival in time past.

The provincial exhibits were arranged in two buildings which were divided into sections. These buildings were located on the right side of the Carnival grounds from the main entrance. The first building contained, besides the provincial headquarters in the first section, the exhibits of the Provinces of Samar, Cavite, Bulacan, Ilocos Norte, Tarlac, Union, and Iloilo; and the second building those of Pampanga, Bohol, Occidental Negros, Mindoro, Pangasinan, Misamis, Ilocos Sur, Surigao, and the Moro Province.

Samar.—The first of the provincial exhibitions was from Samar, and consisted for the most part of many varieties of native woods, bamboo, bejuco, and mats made from ticog grass. One of these mats was very artistically woven into a map of the Philippine Islands. Besides these there were exhibits of shells, sarsaparilla and other medicinal roots, coal, a small exhibit of

abacá, baskets made of bejuco and bamboo, and about fifteen kinds of dried fish. These exhibits represented Samar's first attempt to compete with the other provinces at the Carnival.

Cavite.—The next exhibition was that from the Province of Cavite, which was very interesting and consisted of a large and representative variety of products not only of the agriculture of the province, such as sugar cane, fruits, tobacco, native vegetables, and a number of varieties of rice, but products from the forests, such as native woods, cabo-negro (*Arenga saccharifera*) and its by-products, furniture, and carved bamboo. There were also exhibits of the products of the native shops and factories, such as bolos, sickles, native hoes, tongs, and other tools made in the many small shops found in different parts of this province. There was an interesting exhibit of sinamay cloth, the weaving of which is carried on rather extensively in the towns of Indang, Rosario, Alfonso, and Silang. There were bottles of preserved fruits, mats, bead work, and many fancy articles representing the household industries of the province. There was also a small exhibit of salacots and native hats which were very attractive. The industrial exhibit of the province included small models of the native rice mills, salt works, and fish traps which are scattered over Cavite Province.

Bulacan.—The principal feature of the exhibit from this province consisted of jusi and silk cloth from Baliuag and Hagonoy. There were also many fine specimens of Baliuag hats, which are among the very best made in the Islands. An exhibit of knives, working bolos, plowpoints, shares, and other implements, some of which were made from iron which is mined near Angat, represented a very important industry. The work of the women of the province was well represented by samples of mats, bead baskets, and a variety of fancy articles. This exhibit while comparatively small was very neatly arranged. The agricultural exhibit scarcely did justice to its agricultural interests.

Ilocos Norte.—The exhibition from Ilocos Norte was remarkable for the many samples of cloth of various kinds, including cloth for mens' suits, blankets, bed covers, towels, pillow covers, and cotton cloths of many kinds woven on the looms found in many of the homes of the Ilocano people. The Ilocos Provinces have justly become famous for the manufacture of these cloths and the exhibit of Ilocos Norte did great credit to this industry, which is one of the leading industries in the province. There was a good exhibit of maguey, the growing of which is a prominent industry in this province. Besides these exhibits

there was a small exhibit of furniture made from bamboo and bejuco, also a small exhibit of tools, such as hatchets, bolos, and chisels.

Tarlac.—The exhibition from Tarlac was very interesting and representative of its leading industries. It included specimens of jars, bricks, and pilones (bell-shaped sugar containers) made in the kilns and potteries of the province for various industrial and commercial uses. There was also a very interesting exhibit of hand work by women, including pillow covers, ties, handkerchiefs, baskets, fans, artificial flowers, and other fancy articles. There were about thirty samples of woods found in different parts of the province, weaving frames and looms, samples of blankets woven on native looms, and about thirty-five different grades of native rope. The agricultural exhibit consisted largely of samples of many varieties of rice, sugar cane, corn, and tobacco, besides a collection of vegetables, including cabbage, eggplant, camotes, peanuts, and fruits, such as bananas and coconuts; in this division there were several models of native agricultural implements. The ceiling of the section was attractively decorated with heads of rice, and the posts at the entrance were tastefully covered with heads of rice and ears of corn.

Union.—The next section in this building contained the exhibits from Union Province. These exhibits included some excellent specimens of fancy work with shells, some of them were made into trays and picture frames, while others were cut to represent flowers. There were also some very attractive specimens of carabao horn and various small articles manufactured from it. Besides these fancy articles there were many small models of carved boats, sleds, and coconut bowls. In this section was a variety of baskets woven from bamboo and bejuco. Perhaps the most prominent feature of the exhibit was the samples of native cloths similar to those made in the Ilocos Provinces; many of the pieces were woven into useful articles, such as bed covers, tablecloths, towels, etc. This exhibit, while interesting, did not do justice to the farmers of the province; there were no exhibits of the three leading crops, namely, rice, tobacco, and corn.

Iloilo.—The last three sections of this building were occupied by the excellent exhibition from Iloilo Province. One of the most interesting features of the Iloilo exhibit was the hats made in Pototan and other towns of the province. There were many fine products of the weaving industry, which is one of the most important occupations of the women on the Island of Panay. The fine collection of piña, jusi, and sinamay cloth could scarcely be excelled anywhere in the Islands. There were

several demonstration looms in operation showing how the different kinds of native cloth are woven. One of the most interesting features in connection with the weaving industry in the Island of Panay was a demonstration of the native method of carding and spinning Philippine silk. The agricultural exhibit was one of the most attractive features of the Carnival exposition and included not only a large variety of agricultural products, but showed that progress is being made in raising the different products of the farms; it showed clearly that Iloilo Province is in its agricultural development far ahead of most provinces in the Philippines. The agricultural exhibit occupied all of one end of the three sections devoted to the Iloilo exhibit. In the right-hand corner was a large pyramid of cotton, and to the left of this were many samples of tobacco, sugar cane, abacá, rice, corn, peanuts, coconuts, and other farm products so arranged as to make them decidedly interesting and representative of the important place which farming holds in Iloilo Province. An interesting feature of this exhibit was the demonstration work in the making of bamboo chairs and furniture which occupied a booth in one of the sections assigned to this province. Another booth in this exhibit contained specimens of stone bowls, mills for grinding corn, lawn tables, plant stands, monument stones, etc., representing an important industry in the town of Guimbal.

Pampanga.—The first exhibition in the second provincial building, and one of the most interesting of the provincial exhibits, was that from Pampanga. It included many samples of sugar, including crude sugar in sacks and pilones, also blocks and small jars of sugar, some confections, canned fruits, etc. At the entrance of the exhibition was a striking display representing the Pampanga sugar industry consisting of a pyramid about five feet in height composed of solid blocks of crude sugar. The growing of sugar cane is the leading industry in this province. The agricultural exhibit included many samples of rice, sugar cane, Mexican June corn, tobacco, vegetables, and fruits. The display of vegetables consisted of potatoes, melons, cabbage, beets, peanuts, etc., while the principal fruits displayed were mangoes, bananas, lemons, and coconuts; this exhibit included a number of agricultural implements, working bolos, and other farm tools. Other industries of the province were represented by many pieces of furniture, including chairs, tables, wardrobes, and cabinets, a number of which were beautifully inlaid with mother-of-pearl, musical instruments, native hats, and the products of the distilleries in the province. Pampanga won the

first prize for the best agricultural exhibit at the Carnival in 1910.

Bohol.—The exhibition by the Province of Bohol was the first which this province has made at the Carnival. It consisted principally of rice, copra, maguey, abacá, shells, mats, and sinamay cloth. Besides these products there were on exhibit samples of furniture, buri, bead work, and buttons made from coconut shell. At the entrance of the exhibit was a cage of bats or flying lemurs, called "caguans" which attracted much attention. The caguan is an animal somewhat resembling the flying squirrel, and so far as known is found only in Bohol. This animal produces the most beautiful and valuable fur found in the Islands. Visitors were given very neat folders giving a brief sketch of the history of the province, its population, area, points of interest, and an account of the principal agricultural and industrial products of the Island. In this folder we find the following: "The Bohol exhibition at the Philippine Carnival for 1911 is only a 'trial' or 'practice' exhibition, and Bohol intends to fully utilize the experience gained in 1911 for the Carnival in 1912."

Occidental Negros.—The agricultural part of this exhibit consisted mostly of about ninety varieties of rice, some corn, copra, tobacco, hemp, cotton, peanuts, and a number of different sizes and models of the Vargas plow, which is largely used in the Islands of Panay and Negros. There was a considerable exhibit representing the fishing industry, which included fish traps, nets, baskets, and other fishing equipment, also a quantity of shells and sea products. There were a number of samples of jusi and piña cloth showing that the weaving industry is prominent in the province. Other industries of the province were represented by musical instruments, baskets, specimens of pottery, petates, rope, hats, and canes. The natural resources of the province were represented by exhibits of coal, dammara, bejuco, sulphur, and beeswax.

Mindoro.—One of the most interesting of the provincial exhibits was that from the Island of Mindoro. The first display that attracted attention on entering this section was the fine samples of abacá (Manila hemp) from the Aldames plantation. This hemp was taken from a camarin at one of the principal ports of Mindoro and represented the quality of hemp which is being produced and shipped from that province. The color, fineness, and cleanness of the fiber will certainly enable it to command a high price in the best hemp markets. Following the hemp exhibits there were some fine samples of ebony logs which were brought to Manila, just as they had been fallen and trimmed, for

exhibition. The forestry exhibit included a forest map of the island and about 75 samples of woods growing in the forests of Mindoro. Perhaps one of the most attractive features of this exhibit was the many varieties of orchids on exhibition and for sale, which attracted the many admirers of this plant. There were samples of coal, coconuts, sponges, tobacco, bejuco, rice, etc. There were photographs showing the progress already made on the plantation of the Mindoro Development Company. Judging from the character of Mindoro's exhibit at this year's Carnival, something of much greater interest representing the agricultural, industrial, and natural resources of this great island may be expected in the exhibit from Mindoro for the coming year.

Pangasinan.—The exhibition of Pangasinan was one of the most attractive of the provincial exhibits. On the walls of this section were arranged large and artistically framed photographs of the public buildings, roads, and bridges of Pangasinan, which is said to be the banner road province of the Philippines. The agricultural exhibit consisted principally of rice, tobacco, and coconuts. At the back of the section there was a very neatly arranged booth which was devoted almost entirely to an exhibit of the different varieties of rice and tobacco grown in Pangasinan; there was also a fine exhibit of a large variety of vegetables grown in the province.

The industrial exhibit covered a variety of industries. Perhaps the most prominent of these was the exhibition of hats from the town of Calasiao. This town is famous not only throughout the Philippine Islands but in other countries for the fine grade of hats which it produces. The weaving exhibit included a model loom used for demonstrating the work of making "sedalina" cloth (imitation silk) as it is done in Pangasinan. There were many samples of blankets, cloths, and other woven articles. A number of specimens of fine handiwork, such as women's gowns, pillow covers, fascinators, and fancy work, represented the industries carried on by the women of the province. There was an interesting exhibit of fishing paraphernalia, such as traps, nets, seines, etc., which represents a well-developed industry of many of the people. The dyeing industry was represented by a small model of one of the native dyeing establishments of the province. Another industry represented was furniture making; there were several samples of furniture which were of original design and well made. There was also a small exhibit of minerals, woods, picture frames, and shell ornaments.

Misamis.—While the exhibit from Misamis was small as compared with that of some provinces it was interesting in that it

showed that considerable progress is being made in the development of the resources of this distant province. The exhibit consisted principally of samples of woods, abacá, rice, coconuts, bejuco, shells, etc. There was a good exhibit of manufactured articles consisting of furniture, hats, mats, sinamay cloth, spreads, towels, curtains, and a model of a native plow used by the farmers of the province.

Ilocos Sur.—From an industrial standpoint this was the most interesting exhibit from the provinces. The principal industries represented were carriage making, harness making, saddle making, weaving, wood carving, and silversmithing. There were three very fine samples of work in carriage making—a calesa, carromata, and a quiles, all of which did very great credit to the representatives of this trade. Some excellent samples of saddles, of single and doubleharness, and men's shoes testified to the ability of the workers in leather. The exhibit of Ilocano cloth was especially attractive and contained some very fine blankets, a variety of cotton cloths for suitings, towels, and almost everything in this line which can be made on the hand looms used. This part of the exhibit included four demonstration looms which were being operated for the purpose of demonstrating the manner of making the different kinds of cloth which are woven in the province; there was also a demonstration of the making of Tinguian cloth by one of the women of this tribe which forms a part of the population of Ilocos Sur. There were some good samples of work in wood carving and a number of fancy articles in silver. The agricultural exhibit consisted of a number of samples of rice, corn, sugar cane, coconuts, tobacco, maguey, and a variety of vegetables.

Surigao.—The exhibit from Surigao consisted principally of its forest and mineral products. The forest products were represented by many samples of woods, including red narra, camagon, molave, and bejuco. There was a very good specimen of a table the top of which was made from one piece of narra, also a number of large bowls made from one piece of wood, some of which were more than 4 feet across. There were many spools of hemp fiber prepared for use in weaving sinamay cloth, a number of shells, samples of coal, some bead work, baskets, fancy work, and chalk, also a variety of vegetables and fruits.

Moro Province.—To many the exhibit of the Moro Province was the most interesting of all. In this exhibit all of the different districts of the province were represented. There was a very large and attractively arranged exhibit of brass drums,

gongs, vases, bowls, betel-nut boxes, pots, trays, etc. Moro cloth, Bagobo bead work and clothing, Sulu cloths, a collection of tortoise and pearl shells, Moro spears, krises, campilans, shields, lantacas or Moro cannon, and a variety of bolos for use in war as well as in agriculture, formed a prominent part of the exhibit.

The principal agricultural and industrial exhibits were some very fine samples of abacá (Manila hemp) from Davao, a good collection of coconuts, gutta-percha, dyewoods, cinnamon bark, wax, copra, sponges, a variety of seeds, and a fine collection of the woods found in Mindanao.

This year the Carnival board of directors gave more attention than ever before to the agricultural and industrial features, and the results were manifest in all of the provincial exhibits. The judges of these exhibits announced their decisions on Wednesday, February 22, as follows:

Silver cup for the best provincial exhibit, Iloilo; second prize, silver medal, Occidental Negros.

Silver cup for the best agricultural exhibit, Pampanga; second prize, silver medal, Pangasinan.

Silver cup for the best industrial exhibit, Ilocos Sur; second prize, silver medal, Tarlac.

Silver cup for the most artistic display, Moro Province; silver medal, second prize, Surigao.

THE GOVERNMENT EXHIBITS AT THE CARNIVAL.

INTRODUCTION.

At the Carnival of 1911 eight Bureaus of the Government of the Philippine Islands, namely Education, Printing, Public Works, Health, Agriculture, Internal Revenue, Science, and Forestry presented exhibits for the purpose of showing the importance of the work which they are doing for the improvement of the health, knowledge, and material welfare of the people of these Islands. The exhibits of the Bureaus of Health, Agriculture, Internal Revenue, Science, and Forestry were displayed in a single building, while the Bureaus of Education, Printing, and Public Works had separate buildings devoted to their respective exhibits. The exhibits made by the different Government Bureaus at the Carnival of 1911 were superior to those of any previous Carnival, and there can be no question but these exhibits are becoming each year more and more valuable as a means of showing the general public the details of some of the more important lines of work of the Government Bureaus.

THE BUREAU OF HEALTH.

The exhibit of the Bureau of Health was appropriately placed next to the exhibit of the Bureau of Agriculture, the two booths having a common entrance.

Health and agriculture vitally concern the Filipino people and constitute the basis of their future prosperity. If between health and agriculture there be inserted education, a trinity of factors is presented upon which depends the development of the race. Health is given first place because no nation or people can attain to the highest success without the blessings of health.

The purpose of the Bureau of Health exhibit was to illustrate, in a simple way, the possibilities of health culture as the Bureau of Agriculture showed the possibilities of the soil under proper cultivation.

The first exhibit after passing through the entrance was a miniature model of a nipa house having sleeping porches, perfectly ventilated, a cement drain for the yard, a sanitary kitchen, and sanitary appointments. If nipa houses are properly constructed they are the most sanitary houses that can be built.

The next exhibit in the aisle was a model of Santa Monica barrio in Tondo, showing the haphazard arrangement of the houses with reference to alignment and street lines; their crowding together like dwarfed trees in a jungle, and the insanitary, imperfectly drained ground space that can never be kept clean.

The third exhibit showed Santa Monica barrio as it will appear when it is made a sanitary barrio. The difference between an ordinary barrio and a sanitary barrio is the difference between order and chaos.

The sanitary barrio system requires that each house front either on a street or an alley. If there be no alleys they are made. This necessitates the destruction of some houses and the removal of others so that there may be perfect alignment and free ventilation. The ground space is drained and cross drained until it is dry. All hidden places are uncovered so that the interspaces are accessible to the health-giving rays of the sun and to unobstructed, uncontaminated currents of air. With model houses erected in sanitary barrios, former pest holes of Manila will become veritable health resorts.

The fourth exhibit showed the septic-vault system, with its filtering and absorbing compartments, which was devised a few years ago by a British engineer and put into operation in certain parts of England. This system has been successfully used in Manila and is the next best thing to the modern sanitary sewer.

The fifth exhibit was that of a miniature estero with a retaining wall along its entire length and a section of low land that had been filled and raised to the proper level, according to the plan contemplated in the proposed scheme of municipal improvements.

The sixth exhibit showed a municipal filter system and graphically illustrated how water is rendered pure by underground percolation.

The seventh exhibit was that of a mountain barrio, showing the difference, with reference to purity, between surface water and artesian-well water. The miniature old-fashioned well and the artesian well, being exact in structure, showed how impossible it is to keep the one from becoming contaminated and how well protected is the other. One of the principal disadvantages of provincial life has been the water supply. This has been overcome by deep artesian wells.

The eighth exhibit was a model of a provincial dry-earth closet designed to replace the insanitary structures that time will doom to destruction with not a single protest from anybody.

On the two sides of the aisle were arranged large shelves on which were placed various exhibits. Beginning with the left-hand side there was a graphic representation by test tubes and drawings of the nutritive values of different native foods and their relative cost. This exhibit while probably not understood by all the visitors was one of the most instructive and most scientific displays of the Carnival. Supplementing this exhibit were artistically prepared charts illustrating cheap balanced rations for each day of the week with suggestions for appropriate daily variations.

The second shelf exhibit consisted of samples of polished and unpolished rice, teaching a lesson with regard to beriberi. It is now known that eaters of polished rice frequently have beriberi and that the substitution of the unpolished rice for the polished rice causes the disease to disappear. Beriberi mothers impart the disease, which is very fatal to nursing infants, through the milk. The remedy is to withdraw the infant from the breast and substitute artificial feeding until the mother can be cured by proper food. In all Government institutions polished rice is forbidden, and its importation may be the subject of legal restriction by the next Legislature. Beriberi is no longer a disease in institutions where unpolished rice is used. It has been entirely eradicated from Bilibid Prison, Iwahig penal colony, Culion leper colony, the San Lazaro Hospitals, and the tuberculosis camps of the Bureau of Health.

Next to the beriberi exhibit were a number of glass jars showing the mosquito-breeding process and how the larvæ can be destroyed by petroleum. This exhibit showed miniature beds with sleepers protected and unprotected from mosquitoes, and was supplemented by charts showing the mosquito in action, thus illustrating how malaria and other mosquito-born diseases are transmitted. The different phases or cycles of the life of the mosquito were fully explained by charts, which also set forth the names of the disease for which the mosquito can be blamed. When it is remembered that malaria, dengue, yellow fever, and filariasis are conveyed by mosquitoes, the importance of instruction along this line will be recognized.

After the mosquito exhibit came the fly-breeding exhibit, which consisted of jars of stable refuse in which flies were being incubated and hatched. Flies are the enemies of sanitation. They may carry the germs of cholera, dysentery, typhoid, and nearly all intestinal diseases and undoubtedly have a part in the dissemination of tuberculosis, pneumonia, and other dangerous communicable diseases, all of which was forcibly impressed on



PLATE V.—BUREAU OF AGRICULTURE EXHIBIT OF CORN, COCONUTS,
VEGETABLES, AND FRUITS.

the public by the charts accompanying this exhibit. May the time come when the fly will be in as bad repute as the bedbug.

Near the rear of the booth was the milk exhibit, which consisted of a collection of milk containers varying from the bamboo joint to the impervious galvanized metal can with tight-fitting top which is now required by the Bureau of Health. Analyses setting forth the improvement of the milk supply under the new sanitary regulations were displayed in chart form. The exhibit was supplemented by photographs showing the *before* and the *after* of the milk business in Manila and the difficulties which confront the Bureau of Health in its campaign for pure milk and healthy babies.

On the right-hand side of the entrance to the booth between the passageway to the booth of the Bureau of Agriculture and the doorway was arranged a series of pictures portraying cholera and tuberculosis. The cholera exhibit consisted of two pictures; the first showed a family eating out of a common dish with their fingers and illustrated how the disease is frequently conveyed, while the second showed a family that used knives, forks, and spoons, thus avoiding contamination of food by soiled fingers. Some one has said "no house, no tuberculosis." It might be said with equal truth, so far as the Philippine Islands are concerned, *no fingers, no cholera*.

Side by side with the cholera picture was a series of four pictures, numbered from one to four, with the following significations:

1. A father with consumption coughing and spitting on the floor.
2. An only child crawling on the sputum soiled floor.
3. The sickness and death of the child from tuberculosis.
4. The burial of the little one and the sadness of the heartbroken mother and the death-doomed father in their childless home from which the last ray of hope had departed.

American and Filipino employees were present during Carnival hours to explain the significance of the exhibits and charts and to emphasize the warning "DON'T SPIT."

THE BUREAU OF AGRICULTURE.

The Bureau of Agriculture exhibit at the 1911 Philippine Carnival was designed to show to the fullest possible extent the present agricultural conditions of the Islands and to illustrate the possibilities of improvement along different lines of agricultural work. In most cases, both the common and improved types of products were exhibited in order to show what can be done by better agricultural methods.

The fiber exhibit was probably the most comprehensive that has ever been seen in the Philippines. Almost all known varieties of commercial Philippine fibers were shown, and in most cases were supplemented by articles of native manufacture to demonstrate their economic value. Growing plants of abacá, maguey, sisal, cotton, and sansevieria were shown in connection with the fibers and fiber products.

Manila hemp (abacá), the principal Philippine export, naturally comprised the most important part of the exhibit. A large number of samples of both machine and hand stripped fiber, from all of the principal abacá-producing sections of the Archipelago, were on exhibition. Samples of fiber, both loose and in miniature bales, were arranged so as to show the different commercial grades. The advantages of improved methods of stripping were illustrated by a comparison of samples that were produced by the crude native process of hand stripping and by modern fiber-stripping machinery. An interesting collection of native abacá cloths, harness, and other products was shown. An excellent exhibit of abacá rope, both oiled and natural, ranging in size from heavy cables to wrapping twine, was contributed by the Pickett-Johnson Rope Company.

First-grade samples of machine-cleaned maguey fiber from Cebu, hand-cleaned fiber from the Ilocos Provinces, and several pieces of maguey cloth from different provinces were shown. Fine samples of pineapple fiber (piña) and the highly prized piña cloth from various provinces were shown. White and brown cotton from Cebu, Ilocos Norte, and Ilocos Sur; buri, different varieties of banana fibers, cabo-negro, sansevieria, nito, etc., were exhibited in an attractive manner, also hats, mats, baskets, and other articles made from native fibers.

The rice exhibit comprised over 200 varieties of rice, both lowland and upland, grown principally at the Alabang stock farm and in the Province of Iloilo. The exhibit was arranged so as to show most of the varieties in both the hulled and unhulled state; many of the rice samples were also shown in the head. A large shock of Alabang rice, composed of sheaves of the entire plants, formed an attractive center of the rice exhibit. Several glass cases showing the comparative size and length of the grains of different varieties of Philippine rice was a very instructive feature of the exhibit. The coat of arms of the Philippine Islands, made from different varieties of rice grown in the Islands, was a part of the rice exhibit that attracted a great deal of attention.

The possibilities of profitable corn culture in the Philippines



PLATE VI.—BUREAU OF AGRICULTURE EXHIBIT OF FORAGE, VEGETABLES,
AND CACAO.

were shown in a very striking manner. Samples of Mexican June corn grown by an American farmer in the Province of La Laguna showed beyond all doubt that the very best grades of corn can be grown in the Islands. Several varieties of native corn, improved and unimproved, and hybrids of foreign and native crosses were shown. Sheaves of green corn on the stalk from Lamao experiment station and Alabang stock farm were excellent examples of the advantages of proper cultural methods.

A complete collection of the commercial grades of crude sugar from Iloilo was the most striking feature of the sugar exhibit. Common varieties of sugar cane from Pampanga and Occidental Negros, two samples of very large cane from La Carlota, and several samples from other cane-producing provinces gave a good idea of the general quality of sugar cane produced in the Philippines.

The coconut exhibit included practically all varieties of coconuts grown in the Islands. The general collection of nuts was obtained from a number of different provinces, while two especially large nuts, one of which measured 89 centimeters in circumference, came from Pangasinan. Commercial samples of copra and a model of a native machine for extracting copra from the shell were shown. Especially unique features of this exhibit were two seedling coconuts from Iloilo containing two and three sprouts respectively. It is very seldom that more than one sprout breaks through the husk of the nut.

In the tobacco exhibit, samples from all tobacco-producing sections of the Islands were shown. Tobacco cured properly and that cured by the crude methods commonly practiced were exhibited together in order to illustrate the advantages of the former method. The samples from the Cagayan Valley, Panay, and Isabela were especially good.

Green coffee in the drupe from Iloilo and ripe Liberian coffee on the branch from Lamao were displayed. Cacao in the pod from Batangas and the dried beans from Iloilo were shown.

The forage exhibit was a good example of the work that is being done in the introduction of valuable economic plants into the Philippines. Growing plants of guinea grass and Pará grass, sheaves of the same grasses, and sheaves of sorghum and corn were exhibited. Ground foods for both stock and human consumption were contributed by the Pandacan Forage Factory.

The exhibit of fresh fruits and vegetables received daily from the Baguio experiment station and the fruits and vegetables from Lamao experiment station was especially interesting. Fresh strawberries, celery, and cabbages from Baguio, and fine water-

melons from Lamao attracted a great deal of attention from Carnival visitors.

The rubber exhibit was made up of a number of Pará seedlings from the Singalong experiment station and a sample of Ceara rubber from La Carlota. Pamphlets explaining the care and cultivation of rubber seedlings were distributed.

Mr. R. L. Clute showed an interesting exhibit demonstrating some fundamental principles of practical agriculture. The exhibit included plants growing under control. It was demonstrated that plants can be fed and watered and that their growth depends on the amount of food, water, and air in the soil. It was shown that peanut plants, horse manure, lumbang cake, tankage, nitrate of soda, muriate of potash, and sulphate of ammonia contain food for maize plants; that water and abundant air are necessary for the germination of seed; that the surface soil contains more food for plants than the subsoil; and that maize plants grow better when the soil is drained. Radishes grown from large seed were about six times larger than those grown from small seed. By the use of an egg it was shown how soil water enters the roots of plants; by placing a tumbler over a leaf it was shown that leaves give off water.

Good seeds will germinate and good plants will grow if they have what they need. In a measure each farmer should become an experimenter. He should learn how to economically feed and water his plants. The demonstrations were explained to the people by three pupils from the Sampaloc Intermediate School.

The general exhibit included different kinds of native agricultural implements, several varieties of indigenous root crops, growing bananas and vegetables from Singalong, and a number of miscellaneous products.

The exhibits were supplemented by photographs and statistical tables and maps. The maps showed at a glance the parts of the Islands where certain crops were of the most importance, while the tables gave the exact amounts produced in each province. Sets of the PHILIPPINE AGRICULTURAL REVIEW, Year Books and bulletins of the United States Department of Agriculture, and agricultural bulletins issued by the Philippine Bureau of Agriculture were distributed.

BUREAU OF INTERNAL REVENUE.

The greater part of this exhibit was made for the purpose of further demonstrating to the public the uses of denatured alcohol for light, heat, and power. A decidedly superior illumination was noticeable from lamps burning denatured alcohol. Stoves,



PLATE VII.—FIBER EXHIBIT OF THE BUREAU OF AGRICULTURE.

flatirons, and other implements of domestic use burning alcohol were loaned by various Manila dealers in order that their value might be demonstrated to the public. Stoves and denatured alcohol were furnished through the Bureau of Internal Revenue for the cookery exhibit of the Bureau of Education and used under the supervision of its agents. It was conclusively demonstrated that denatured alcohol is an entire success in the kitchen; one great advantage over kerosene being the absence of the disagreeable odor which always accompanies the latter.

A portion of the exhibit of the Bureau was given over to showing the development of the alcohol industry since the passage of the Internal Revenue Law in 1904. In 1907, after two years of work and practical demonstrations, the distillers of the Philippines were induced to use modern equipment for distilling; working models of the present equipment were shown, with photographs of various types of distilleries and of the nipa and coconut regions in which alcohol is manufactured. In 1905 nearly 400 distilleries were in operation, 5,483,690 proof liters were distilled, and the tax collected was ₱1,096,738. During the fiscal year 1910 the number of distilleries was reduced to 68, all under modern conditions, 10,584,124 proofs liters were produced, and the tax collections amounted to ₱2,269,160.

BUREAU OF SCIENCE.

The Bureau of Science again this year made an exhibit of silkworms, cocoons, and spun and woven silk. An improvement was made over the exhibit of last year in that instead of the large, complicated, power driven, reeling machine small hand machines were in operation. These hand machines are so simple and inexpensive that the humblest Filipino can have one in his home. This will make possible the introduction of the silk-producing industry into the Philippines. As the silkworm breeds here at the rate of eight generations a year, the production of silk should prove a profitable industry.

Another Philippine industry capable of development is that of fishery. The division of fisheries made an interesting exhibit of food fishes preserved in jars of formalin. But perhaps the most promising business in connection with Philippine fisheries is the possibility of establishing a sardine cannery. Philippine waters abound in sardines and anchovies, and there is no reason why a profitable industry in canning them could not be established.

A handsome screen made of window shell and narra, and porch lights made of narra and sheet brass were also shown. In the same section "La Concha" had an interesting exhibit of a great variety of articles made of mother of pearl.

The division of mines exhibited coal-cutting machinery from Batan, mineral models, and relief maps. The most striking part of the exhibit of this division was a complete model of a cyanide mill for extracting gold from ore. Every part of the process was shown, from the dumping of the ore from the cars into the mill to the final extraction of the gold from the solution. The models of gold bars showing the output of gold for the years 1907, 1908, 1909, and 1910 indicated a marked falling off in the production from 1909 to 1910. This was due partly to the wrecking of one of the Benguet mills by a flood, and partly to the fact that one of the dredges at Paracale was out of repair for some months.

BUREAU OF FORESTRY.

Next to the exhibits of the Bureaus of Education and Printing, that of the Bureau of Forestry was the most extensive of the eight Government exhibits. Not only was it larger than the 1910 exhibit, but a greater variety of forest products was shown than at any previous Carnival.

The walls were completely lined with a collection of 10-foot planks from the Forestry Museum. The number of species represented by these planks has been greatly increased during the past year, so that there remain but few well-known and plentiful timbers to be added. Of the Lauan family (*Dipterocarpaceæ*), for instance, planks were shown representing all of these very abundant woods except bagtican-lauan (*Parashorea plicata*). Similarly, in the Narra family (*Leguminosæ*), of the seven most important woods, narra, ipil, banuyo, acle, tindalo, supa, and balete, all except the last were represented by magnificent planks. Besides these two, there were planks of twenty-four other families which, with other exhibits such as logs and manufactured articles, brought the total number of timber species in the exhibit up to over one hundred and forty. Among the planks three attracted much attention; these were one of ipil, 35 inches by 25 feet, for which there was no space in the exhibit to show it to advantage, and one each of molave and acle, 42 and 35 inches wide, respectively, which stood on end on the floor with their corners touching the canvas roof 18 feet above.

A striking feature of the exhibit was the number of one-piece table tops displayed, ranging from a glittering gem 50 by 80 centimeters, of dao, to the huge lauan table 2.92 meters in diameter, on which the incredulous public wasted hours of time trying to find the joints. Equally conspicuous were many other pieces of finely finished furniture of various woods, loaned to

the exhibit by private individuals and by manufacturers, while everywhere, on walls, tables, and suspended under the roof, were numberless articles of use or ornament in house, field, and forest, manufactured of almost every conceivable forest product, from palm leaves and rattans to molave and mancono. Among the raw products, the most conspicuous were the exhibits of gutta-percha and dammara (almaciga). The collection of dammara was probably the best ever gathered in the Philippines, including, as it does, half a dozen specimens ranging from 35 to 44 kilos, and scores of smaller pieces, of every color from black to the purest amber.

Add to the variety of fantastic shapes and gorgeous colors displayed, the attractions of masses of green in every available space, and of a multitude of chairs and benches, and it is not surprising that the foot-weary sightseer often spent an hour or more drifting from one seat to another before going out again into the noise, glare, and confetti.

BUREAU OF EDUCATION.

In the Carnival of 1911 the Bureau of Education demonstrated to the public by means of a comprehensive exhibition of industrial work from all grades of the public schools that industrial education is firmly established on a practical basis, and judging from the eulogistic expressions of satisfaction that have been heard on all sides, and the still more potent evidence of nearly ₱9,000 of the public's good money that was eagerly exchanged for the products of the schools, there is no reason to doubt that the public has set the seal of its unqualified approval on the present system of education that is making the product of the schools self-supporting and self-respecting citizens. Practically every province of the Archipelago was represented with all grades of work from the little lamp mat of buri weave by the first grader to the filing case of nara or other precious wood beautifully made and finished by the seventh grader in a trade school.

Approximately 15,000 articles were exhibited, an average of about 400 finished and selected articles from each province, the total value of which exceeded ₱10,000. This represents but a small fraction of the industrial work being accomplished in the schools of the Archipelago, as only a few of the choicest articles were selected from each school and province for the Carnival exhibition.

This exhibition demonstrated the great possibilities of the Islands in the way of materials for home industries, and the

courses being given in the schools under the direction of the Bureau of Education are designed to make full use of the latent resources of the Islands by developing such minor industries as will serve to occupy the idle time of a people essentially agricultural, the development of which will add materially to the wealth of the country and contribute largely to the well-being of its inhabitants.

One of the features of the past Carnival from which much good is expected was the attendance at the exhibition of some of the leading workers in the industrial schools of the Islands, male and female, American and Filipino, all of whom will take back to their respective provinces a fund of information obtained from daily contact with the public and from the actual handling of the exhibits, which knowledge should be of inestimable value when properly disseminated by the 8,000 teachers upon whom fall the daily task of directing the industrial work of the schools.

A series of industrial conferences were held during the Carnival at the general office of the Bureau of Education. A copy of the program follows for the information of those who are interested in knowing the different problems that are being worked out by the Bureau of Education.

PROGRAM FOR CONFERENCES OF INDUSTRIAL TEACHERS ACCOMPANYING THE 1911 CARNIVAL EXHIBITS.

These conferences were held under the direction of Mr. C. H. Magee, Second Assistant Director, from 10 to 12 a. m. on February 23, 24, 25, 27, and 28, 1911.

February 23.

1. "Establishment of primary woodworking shops and the effect on trade and manual training schools." Alma Beck.
2. "The limits of cabinetmaking and the teaching of building trades in the trade schools." Bruce Ingersoll.
3. "The correlation of mechanical drawing and shop work." George Hofstetter.
4. "Bamboo and rattan work and its limits in industrial instruction." R. B. Robinson.

February 24.

5. "Relation between primary and intermediate industrial work." Kilmer O. Moe.
6. "School gardening." Lewis S. Thomas.
7. "Philippine preserves, jams, and jellies." Miss V. M. Wakeman.
8. "Housekeeping and household arts." Miss Bessie Taylor.

February 25.

9. "How to secure a local and foreign trade for industrial school products." G. G. Lyman.
10. "A system of accounting for primary industrial school work." L. R. Sawyer.
11. "Exhibition work." John H. Finnegan.
12. "Preparation of teachers for primary industrial work." U. S. Andes.

February 27.

13. "Mat weaving." John F. Minier.
14. "Limits of primary industrial work." Mrs. Carrie N. Anderson.
15. "Practical results of primary industrial work." Joseph Loughran.
16. "Household and minor industries of Japan." Austin Craig.

BUREAU OF PRINTING.

Printing, ranking seventh among the world's greatest industries, has become the most important factor in developing organizations and movements and the means of conducting the affairs of the world. This art and craft has a supreme influence upon every line of business and has been the true agency in the rapid advancement of science and mechanics. Though it is a fact of universal knowledge that printing enters into the most minute affairs of the world, the true significance of the progress being made is by no means fully appreciated.

In a unique display by the Bureau of Printing, the actual production of printing and binding by old and new methods constituted an interesting exhibit and gave an idea of the progress being made. A latest model typesetting machine was operated alongside of an employee setting type by hand, demonstrating the wonderful strides made within the last few years in the printing trade. Printing sheets at about 1,200 an hour on a hand-feed platen printing press compared with an automatic-feed printing press delivering 12,000 printed sheets an hour was an interesting operation. The old method of sewing books by hand and the new method of sewing by machinery attracted considerable attention. A modern flat-bed cylinder press was operated. A daily paper called "The Carnival Spirit" was printed on this press.

Besides demonstrating the old and new methods of operations in typesetting, presswork, and bookbinding, employees of the Bureau were executing all the specialties of book finishing, photo-engraving finishing, and electrotpe finishing. Half-tones, electrotypes, and stereotypes were shown in various stages. There was a large display of finished products of the

bookbinders, from pamphlets to full russia leather with extra hubs. Two books were on exhibition which were probably the finest specimens of bookbinding in this part of the world. The bindings were full levant morocco, beautifully hand tooled, and with the edges illustrated.

Special mention should be made of the first public demonstration in the Philippine Islands of the art of marbling. The Bureau only recently added this specialty, and the demonstrations by Filipinos who were taught by an American craftsman instructor attracted more people and held their attention longer than any other demonstration. The crowds marveled at the designs produced considering the manner of throwing the colors.

The Bureau of Printing exhibit presented an excellent idea of what has been accomplished by the proper instruction and supervision of Filipinos in the numerous specialties which enter into the production of a book. The work of the Bureau is done almost wholly by Filipinos under supervision of American craftsmen instructors.

BUREAU OF PUBLIC WORKS.

The Bureau of Public Works exhibit was displayed in a separate building in the form of an open square. This exhibit, which consisted principally of models, charts, maps, photographs, drawings, etc., was remarkably interesting and instructive not only that it showed the progress made with all kinds of public works from the organization of that Bureau up to the present time, but in the consequent greater possibilities for the progress and improvement of health, agriculture, commerce and education. The exhibits were arranged in six divisions: First, surface road construction; second, road maintenance; third, bridges and culverts; fourth, irrigation; fifth, artesian wells; and sixth, special projects.

The kind of surfaced roads being constructed in the Philippines was shown by a model which not only showed the character of the roads constructed, but the three different types of standard bridges used throughout the Islands.

A chart showed the annual increase in the equipment of the Bureau for constructing surfaced roads from 1907 to 1910, as follows: 1907, 5 rock crushers valued at ₱9,400 and 8 road-rollers valued at ₱37,800; 1908, 6 rock crushers valued at ₱14,900, 12 road rollers valued at ₱62,700, and 10 kilometers of tramway valued at ₱20,000; 1909, 17 rock crushers valued at ₱55,000, 31 road rollers valued at ₱177,200, and 60 kilometers of tramway valued at ₱130,000; 1910, 18 rock crushers valued at

₱57,500, 43 road rollers valued at ₱243,200, and 80 kilometers of tramway valued at ₱170,000, which for the present year has been increased to 112 kilometers valued at ₱241,000. The value and importance of this large equipment for the construction of public roads and bridges can not be overestimated.

The progress in surfaced road construction during the past four years was shown by a chart showing the number of kilometers of road constructed and the comparative amount of produce hauled over these roads annually. This chart showed that on June 30, 1907, when the present road policy was inaugurated there were 600 kilometers of surfaced road a large part of which has since been rebuilt. In 1908, this was increased to 796 kilometers; in 1909 to 1,093 kilometers, and in 1910 to 1,344 kilometers. There has been a material increase in the average load hauled. In several cases the load has been doubled or trebled and the average haul quadrupled.

The work of road maintenance in all provinces was illustrated by a chart showing the number of camineros (road men), the number of kilometers cared for, and the amount of money expended each year. This chart showed that in the calendar year 1908, 517 camineros were employed, who cared for 265 kilometers of road at an expenditure of ₱120,000; in 1909 the number of camineros was increased to 1,330, the number of kilometers of road cared for to 742, and the expenditure to ₱390,000; while in 1910 there were 1,966 camineros, 1,252 kilometers of road cared for, and an expenditure of ₱750,000. There are 156 roads under the caminero system, 81 roads maintained by trained gangs, and 60 roads by trained gangs who are employed for a few weeks at a time, the intermittent gang system.

In connection with the work of road construction and road maintenance the bureau had on exhibit a most interesting road map of central Luzon, showing the roads actually constructed and those projected for connecting Manila with the adjoining provinces. The road system determined upon aims at opening to automobile traffic from Manila the provincial road systems of the adjacent Provinces of Rizal, La Laguna, Batangas, Cavite, and Bulacan, ultimately extending them to the north into Pangasinan, La Union, and the Ilocos Provinces, to the east into Tayabas, and to the west into Cavite. This map shows the completed surfaced roads, proposed surfaced roads, alternate routes, railroads, and proposed railroad lines. There are three main roads connecting the capital with the provinces, namely, the North Road, the East Road, and the West Road. The North Road has been com-

pleted as far as Malolos and San Ildefonso in Bulacan. The Bureau plans to complete this road during the year so that it will be possible to make the automobile trip from Manila to Sibul Springs in about three hours. The present plans call for the extension of the North Road to Pangasinan Province and north along the coast of La Union and the Ilocos Provinces. The East Road is intended to connect Manila with Atimonan on the Pacific Ocean. Two or three links of this road have not been constructed, but the funds available amount to nearly ₱400,000, which should practically complete the work. The West Road, which is intended to connect Manila with the town of Cavite and the other towns of Cavite Province beyond, is a costly piece of work, but progress is being made; the current appropriation for this work amounts to about ₱50,000.

Irrigation has for years been recognized by the Government as one of the essentials in eliminating the heavy drain on the resources of the Islands through the purchase of rice abroad. During the Spanish administration many dams, tunnels, viaducts, and distributing systems were constructed, which are scattered throughout the best agricultural portions of a number of provinces. The work of this division has been confined mainly to the maintenance of existing works, to one large construction, to securing topographical and water data, and to design. The funds available for this work at the beginning of the present fiscal year amounted to ₱2,250,000 in addition to the regular annual appropriation of ₱750,000. Approximately all of the preliminary work has been completed on eight projects in five different provinces. These projects will irrigate over 60,000 hectares (150,000 acres) of land. Preliminary work has been begun on projects aggregating an additional 350,000 hectares (857,000 acres). The projects under consideration contemplate the bringing of nearly the entire central valley of Luzon, from Dagupan to Manila, under irrigation.

Representing the division of artesian wells was a model well-drilling outfit; a case with a glass front showed how water collects beneath the earth's surface and how it is brought to the surface and made available by pumps and flowing wells. The work of this division was illustrated by many photographs of wells which have been drilled in different provinces. A chart showed the progress of this work from 1905 to June 30, 1910. In December, 1910, the Bureau had drilled over 400 wells; it owned thirty-six well rigs which were working and completing one well every day. This work aims at improving the quality of the drinking water in the lowland municipalities.

There were photographs, charts, wash drawings, colored plates, or models representing the special projects under the Bureau's supervision, including the public automobile service, the Cebu custom-house, Osmeña waterworks, the Philippine General Hospital, improvements in the city of Baguio, and the Insular Normal School.

The organization and development of the work of the Bureau was well illustrated by a chart showing approximately a twenty-fold increase in the work actually undertaken and carried on between January 8, 1903, and December 31, 1910. This chart showed that in 1904 there were 30 engineers, 2,000 laborers and an expenditure of ₱150,000, while in 1910 there were 110 engineers and 20,000 laborers maintaining 2,350 kilometers of road, constructing 250 kilometers of road and 300 bridges and culverts yearly, operating 36 well-boring rigs, supervising irrigation construction, transportation lines, and Insular, provincial and municipal building work, requiring a total expenditure of ₱8,000,000.

MONTHLY VETERINARY REPORTS—FEBRUARY AND MARCH.

RINDERPEST.

During the past four weeks there have been numerous changes in the rinderpest situation in the Philippine Islands. While there are as many towns infected as there were last month, the chief centers of infection have been confined to Central Luzon.

Cagayan and Isabela.—A month ago there were two municipalities in the Province of Cagayan and two in the Province of Isabela infected with rinderpest. At the present time there is but one infected municipality in each of the above-mentioned provinces.

Pampanga and Bulacan.—The situation in these provinces remains practically the same as it was last month. There are now five infected municipalities in the Province of Bulacan and seven in the Province of Pampanga.

Nueva Ecija.—This province contained three infected municipalities at the time of the last report. There are no known cases of rinderpest there at present.

Tarlac.—In this province the infection is known to be present in six municipalities. While this number of municipalities is infected, there are very few cases, and the losses have been comparatively small.

Pangasinan.—This province presents by far the most serious situation at present, and there are found approximately fifty new cases each week. There is a large force of employees at work in this province, and the provincial officials are taking a great deal of interest in the eradication of the disease. On account of the quarantine which it has been necessary to impose, traffic has been somewhat checked, but to prevent the quarantines from causing any material losses to the residents of the province, the Government has sent several automobiles which are to be used in the transportation of goods from one municipality to another. A large territory being infected, it will be impossible to quickly eradicate the disease, but the effect of the

quarantines which have recently restricted the movement of animals should soon cause an improvement in the situation.

Benguet.—Before the quarantine system could be properly adjusted animals from Pangasinan evidently carried the infection into the Provinces of La Union, Nueva Vizcaya, and the subprovince of Benguet. Such stringent measures were adopted in the latter that it is believed that no further cases will occur. There have been no cases of rinderpest in Benguet since the week ending March 4, 1911.

La Union.—In this province there have been five cases and two deaths in the municipality of Agoo. The remaining municipalities of that province have been carefully inspected and no others centers of infection have been found. Several employees of this bureau are now at work in the southern part of the Province of La Union, and it is expected that the disease will soon be eradicated from the infected municipality.

Nueva Vizcaya.—In this province six cases of rinderpest have recently been found in the municipality of Bambang. The remainder of the province is supposedly free from disease.

From the above summary it may appear that little has been accomplished in the eradication of rinderpest during the last month, and while it is true that the number of infected municipalities in Central Luzon has recently increased, it is equally true that great gains have been made in the southern Islands. Two veterinarians have been carefully inspecting the Island of Panay for several weeks without finding any trace of rinderpest. It is believed that with the eradication of disease from the municipality of Miagao the last trace of rinderpest was eradicated from Panay.

Occidental Negros.—This province has remained free from disease, but one veterinarian has been constantly at work to make sure that no trace of infection remained from the serious outbreak which this province recently sustained.

Oriental Negros.—A month ago there were nine infected municipalities in this province. From present indications it seems that rinderpest will soon be eradicated from the island. The disease has already been eradicated from several municipalities which were infected a month ago, and at the present time actual cases of rinderpest are found in only three municipalities.

Cebu.—This island has two infected municipalities, but there are only two cases of rinderpest in the province.

Bohol.—This island has one infected barrio in the municipality of Talibon.

Leyte.—In this island the municipalities of Tanauan and Tolosa are infected. There has been only one case of rinderpest in the municipality of Tanauan for some time.

Surigao.—In this province two municipalities are considered infected, but there has been no rinderpest in one of these municipalities for nearly a month.

Moro.—As stated in a previous number of this publication, the Davao district of Mindanao has suffered from a severe epizootic. The great losses which were sustained during the months of November and December, 1910, were quickly alleviated by the application of the most extreme measures ever adopted anywhere in the Philippine Islands, and in two months the disease was practically eradicated. The great success in the rapid extermination of the disease from that district was made possible by the thorough coöperation of the officials of the Moro Province. At first, steps were taken to ascertain the extent of the infection, and as soon as this was determined the quarantine line was drawn around the whole infected area, absolutely prohibiting all animals susceptible to this disease from leaving the infected district. Then, after the surrounding country had been protected, the work of eradicating the disease in the infected localities was begun. The first point taken up was the disposition of the sick animals. These were immediately slaughtered. Then came the problem of the proper disposal of those animals which had been exposed but which had shown no symptoms of disease. These exposed animals were also slaughtered. Then the disinfection of the stables and corrals and the quarantine of fields where sick animals had been was practically all that remained to be done.

MONTHLY CROP REPORTS—FEBRUARY AND MARCH.

ABACÁ.

Ambos Camarines.—The price of abacá continues to go down and rice has advanced from ₱6.80 to as high as ₱8 in Paracale and Mambulao.

Bohol.—The price of abacá in Cebu has dropped during the month and on this account very little is harvested.

Mindoro.—Abacá is now bringing better prices and larger quantities are being stripped than formerly. Mindoro abacá, when carefully cleaned, brings prices which makes the industry a profitable one.

Sorsogon.—The price of abacá still remains the same as last month for poor grades, but the people will not clean good grades of fiber and are continually complaining about the poor prices that are being paid.

COCONUTS.

Mindoro.—A great many coconuts are now being planted in this province.

Zambales.—Persons looking for profitable investments should not overlook Zambales coconut lands. These lands, practically level and sufficiently open for planting, near seaports, can be had at from ₱25 to ₱40 per hectare. Large areas are now being planted. In Candelaria all coconuts not used for local consumption are planted. In San Marcelino the hill lands are being planted to coconuts, an experiment that will be watched with much interest.

CORN.

Cagayan.—Corn was badly damaged by the drought and a very poor yield is the result.

Capiz.—More corn is being planted this year in this province, and especially in the northern part than was planted last year. The damage done to last year's rice crop by the typhoon in November is given as the cause for this increased planting of corn.

Cebu.—The corn crop already harvested did not meet expectations and the growing crop is not expected to materialize to any

extent by reason of a lack of rain. The outlook as regards food for the poorer classes is anything but promising.

The present crop of corn will not be sufficient to supply the demand. This grain is now being sold at exorbitant prices. Those who can afford to do so are holding in store such quantities of corn as they are able to purchase in anticipation of more excessive rates.

Ilocos Sur.—Corn is now being harvested in the subprovince of Abra and a fair crop is reported.

Iloilo.—The municipalities of Santa Barbara, Pototan, and Passi are planting large tracts of land to corn.

Passi appears to have better looking corn and more of it than any other municipality in the central part of the province.

Nueva Vizcaya.—The area planted to corn during 1910 in the municipality of Bayombong was 117 hectares, there being no increase over that planted during 1909.

Oriental Negros.—Corn is the main crop in the southern part of this province and was being harvested during the latter part of January. The returns from this crop are very fair and no complaints are being made.

GUINEA GRASS.

Ilocos Sur.—The guinea grass that has been planted in Vigan is doing well. About 75 per cent of the plants are alive. The guinea grass at Bangued is also growing well.

KAPOK.

Oriental Negros.—Machinery for cleaning and pressing kapok has been installed in Dumaguete. There are about 100,000 kilos of crude kapok produced in Oriental Negros each year. This represents about 33,000 kilos of the cleaned article, as it is generally understood that 3 kilos of the crude kapok will produce 1 kilo of the cleaned first-grade article. The season begins about the 1st of April and continues until about the 1st of September.

RICE.

Albay.—The harvesting of the rice crop has continued well on into the month of February, the yield being about normal.

Ambos Camarines.—The present indications are that the rice crop in Camarines Norte will be the largest in many years. Nearly all of the rice land has been planted in that part of the province and the crop is now beginning to head out. The heavy rains of February were very favorable for the rice crop. The people in Camarines Norte are very hopeful and enthusiastic

over their prospects. Rice harvesting in the lower Bicol Valley regions is now nearly over and the crop has been a very poor one, due to a combination of unfavorable conditions. The rice crop suffered more than usual in this section from rats, birds, and insects, and it is estimated that from 50 per cent to 75 per cent of a normal crop will be obtained.

Antique.—It is almost impossible to purchase either palay or rice in Pandan or Culasi. The people are holding what little they have to supply, in so far as it will, their own needs. A second crop has been planted in some sections of Pandan. Camotes, corn, and mongo crops will probably be sufficient to prevent much want until the next regular palay crop is available.

Bohol.—The people in some of the towns, especially in Calape, are in a bad financial condition, as the last rice crop was mostly destroyed by rain and floods and the market price of rice has increased considerably. They expect to have a good crop in April and May.

Iloilo.—The rice crop has been harvested and is from 25 per cent to 50 per cent short all over the province.

In the municipalities of Santa Barbara, Jaro, and Pototan some of the rice planters are beginning to plant mongos in the rice fields after the rice has been harvested.

Isabela.—Rice is selling for ₱8 per sack in the local market in Echague and is very scarce. In Ilagan second-class rice is selling for ₱7 per sack and first-class for ₱9 per sack. There is plenty of rice on hand in the local market in Ilagan.

Mindoro.—A big crop of rice will be planted in April.

Nueva Vizcaya.—In the municipality of Dupax the bulk of the palay crop was harvested in January. The area planted to palay in 1909 was 859 hectares and in 1910, 965 hectares, showing an increase of 106 hectares. The palay is of good quality, and the crop of 1910 shows an increase of 10 per cent over that of 1909. In Bayombong the area planted to palay in 1909 was 701 hectares and in 1910, 983 hectares, showing an increase of 282 hectares. The crop for 1910 showed an increase of 20 per cent over that for 1909. In Solano the palay is of good quality, but the crop for 1910 showed little increase over that of 1909. The area planted to palay in 1909 was 1712 hectares and for 1910, 1715 hectares, an increase of 3 hectares. In Bagabag a decrease of 20 per cent is noted in the palay crop. The area planted in 1909 was 772 hectares and in 1910, 480 hectares, a decrease of 292 hectares. This large decrease is due to lack of water for irrigation and lack of work animals.

Oriental Negros.—Recent reports from the southern part of

the province indicate that the rice crop is yielding about three-fifths of the usual harvest.

Sorsogon.—Rice planting has been going on during the month of January and weather conditions have been very favorable. In the vicinity of Bacon, Gubat, and Sorsogon 100 per cent more rice has been planted than at the same date last year.

Surigao.—The rice crop this year will be a failure on account of drought, but no actual lack of food is expected on that account, as the people here have planted a great deal of corn, camotes, and other crops. Nearly all of the farmers have either abacá or coconuts, so that in case of the failure of the rice crop they can always strip abacá and buy the necessary rice. This, however, means more work and a little less money for luxuries.

Zambales.—About 300,000 cavans of unhulled rice will be shipped out of this province this year. The present crop is considerably above the average. The municipality of San Narciso leads with a crop of 25 per cent better than last year. As against this increase in crop 5 per cent more land was cultivated. Candelaria will double the amount shipped out last year but has increased the acreage by 30 per cent. All municipalities, excepting Iba and Palanig, report an increase over last year. The lowland rice grown is a small, flinty, bearded variety, easily hulled but not very prolific.

In the municipalities of San Narciso, San Marcelino, San Antonio, and Castillejos there is a communal irrigation system, completed in 1872, by which 50 square miles of rice land can be irrigated. This system formerly furnished water to these towns at all seasons of the year. It is at present, however, badly in need of repair. The landlords insist that the tenants should keep it in repair, while the tenants claim that the expense should be borne proportionately. The provincial board now has the matter under consideration. If the system were repaired, the four towns above mentioned could easily produce more rice than is now grown in the entire province.

SUGAR CANE.

Antique.—Sugar cane was being harvested during the month of January and a good crop is reported. Lack of transportation has prevented any shipment of sugar.

Cebu.—The last crop of sugar harvested was only a fair one. The *hacenderos* are holding this in anticipation of a better price than that which is now offered.

Ilocos Sur.—The people in this province are now harvesting

their sugar cane. The crop is above the average, but the price is low.

Iloilo.—The yield of sugar is very satisfactory this year, and most of the sugar planters are making efforts to double their crop for next year. Several new sugar plantations have been recently started.

Along the Philippine Railway more land is being prepared and planted to sugar cane this year than last. Between the municipalities of Panitan and Pontevedra there is a large tract of new land being planted to sugar, while further north on the coast of Pontevedra Bay there are three large sugar *haciendas* which will have as much land under cultivation this year as they will be able to plant and cultivate.

La Laguna.—The farmers of Calamba, Santa Rosa, and Biñan are busy milling cane. They will plant almost double the area of last year. Planting is now in progress. Large areas which have remained uncultivated for many years are now being plowed and planted.

Oriental Negros.—Sugar cane was being harvested in this province during the month of January, and the sugar planters are very well satisfied. There has been some complaint about the difficulty of harvesting on account of the rigid quarantine now existing. The planters have found, however, that horses and men can be used to good advantage in this work, and while it is slightly more expensive the work appears to go on just as rapidly.

TOBACCO.

Agayan.—Growing tobacco, although somewhat damaged by the extremely dry weather of January, is looking fairly well and a fair yield is expected.

Capiz.—Considerable tobacco is being raised all along the coast of Capiz Province, especially in the municipalities of Calibo and Ibajay. The tobacco is growing nicely but will be of inferior grade, as it is raised too near the sea.

Ilocos Sur.—More tobacco has been planted in the subprovince of Abra than for a number of years past, and it is reported to be growing nicely.

Iloilo.—There is much more land under tobacco cultivation this year than either last year or the year before. At the present time the tobacco crop has not been damaged in any way and appears to be in first-class condition.

Isabela.—Practically all of the tobacco in the municipalities north of Cauayan has been sold and is now being shipped out

of the province. The average price per fardo this year is about ₱3.75, which is about ₱2 less than the price paid last year for the same product. Up to the present writing very little tobacco has been sold in the municipalities of Cauayan, Echague, Tagle, and Santiago. All of the farmers in this section are holding off for better prices, but it is believed that they will yield to the buyers' rates during the month of February. Nearly all of the farmers in the towns of Echague, Tagle, Santiago, and Cauayan have completed the planting of this year's crop, as this section has been favored with more rain than the northern part of the province. On account of the dry weather which prevailed in the municipalities of Naguilian, Gamu, Ilagan, Tumauni, Caba-gan Nuevo, San Pablo, and Santa Maria during the month of January, only about one-half of the tobacco crop has been planted in this territory.

NOTES FROM OTHER FIELDS.

RUBBER AND CACAO.

Under the above caption, the *Tropical Agriculturist*, Volume XXXVI, No. 1, gives timely warning of the danger that may result from interplanting rubber and cacao. It is stated that in some districts of Ceylon, in West Africa, and in other countries the combination has been very successful, but the situation has been entirely changed since the discovery by Mr. Petch that the canker which has long been known to be so injurious to cacao sometimes does great damage to the rubber tree. Where these two cultivations are carried on together, and more especially where they are intermixed, the result will in general be that there will be much more canker on the rubber than in places where there is no cacao. Not only does the presence of the cacao increase the actual amount of the canker fungus in the plantation, but its presence also makes the shade greater and the air damper, both of which conditions tend to the more rapid spread of the disease.

Consequently it is evident that where cacao canker is universally distributed, as in Ceylon, rubber and cacao should not be intermixed in places where they are not already grown together. On estates where they are already intermingled, if the canker can be kept down by prompt and efficient measures, the two crops may be left; but where this can not be done and the canker increases on the rubber, where it does more harm than on the cacao, either one crop or the other should be sacrificed, in order to prevent the loss that might be caused to neighboring estates by the spread of the disease.

SUGAR CONDITIONS IN THE BRITISH EAST INDIES.

The *Louisiana Planter* for January (Vol. XLVI, No. 1) gives some interesting information with regard to the growth of sugar cane in the British East Indies. It is stated that the cane is a perennial, robust grass, with a stem reaching from 16 to 32 feet in height. This stem is cylindrical, solid, and ends in a slender, hollow tip which bears the flower. The roots, which are fibrous and wide spreading, either spread near the

surface, or if planted in loose soil, will strike straight down to a great depth.

There are various qualities and varieties of cane, some thick stemmed and others thin, some soft skinned and others hard, some drought resisting and others needing a large amount of water. One variety known as "Khari" is considered exceptionally good, as it withstands drought and water logging well, resists the attacks of animals, insects, and fungus pests, is prolific and produces a good quality of gur, the indigenous name for *masse cuite*. In India it is noticeable that the land is extensively cultivated, often being plowed eight or ten times and harrowed four or five times. To force the canes ahead, irrigation is resorted to, and fertilizers, largely of domestic production, are used to a considerable extent.

ANTISEPTIC TREATMENT FOR HEVEA IN INDO-CHINA.

With regard to the introduction of the Hevea plant into Indo-China we quote from the Tropical Agriculturist (Vol. XXXVI, No. 1) the following order issued by the governor-general:

The introduction of the Hevea plant into Indo-China is forbidden. The fruits and seeds of the Hevea imported must be as soon as landed, and before being otherwise handled, treated by an antiseptic solution, according to instructions attached to the decree. The operation shall be carried out at the expense of the consignee, who should notify the expected arrival of such goods several days in advance, so as to obviate delay. In case of contravention of this decree—i. e., introduction of untreated seed—the respective parcels will be seized and destroyed, without prejudice to further penal proceedings. The antiseptic treatment is to consist of placing the seeds in a large meshed basket, to be plunged into an antiseptic solution for half an hour and agitated several times, then washed in three or four waters and laid out in the usual way. The solutions are to consist of 1 to 1,000 bichloride of mercury or of 1 to 100 sulphate of copper minimum. In the latter case the government may increase the strength.

NOTES ON BANANA CULTIVATION.

In the Queenslands Agricultural Journal for January (Vol. XXVI, No. 1) Mr. C. Ross, instructor in fruit culture, gives the following suggestions for successful banana culture:

An ideal banana soil should be plentifully supplied with humus and natural plant food and contain an abundance of moisture. At the same time the drainage must be perfect; a too retentive subsoil should be avoided or artificially drained.

Plants required for a new plantation should never be taken from old worn-out stools. The best and cheapest plants which give the best results are suckers or bulbs separated from the strongest and most vigorous plants that are producing the largest bunches of the finest fruit. The worst possible system is that of continually planting suckers taken indiscriminately

and without careful selection, and this is the most serious of all causes of deterioration in size, quantity, and quality of the crop.

The first essential is thorough preparation of the soil, supplemented with a generous supply of plant food. Nitrogen is needed for the production of stout stems and large leaves. For the production of fruit the most important constituent of the soil is potash, and if this be deficient it must be abundantly supplied.

Localities subject to strong winds are not desirable, as the large delicate leaves when blown into ribbons cause a check to the vitality necessary for producing large bunches.

No intermediate crop should be allowed to grow in the plantation even when young. Weeds and trash should not be removed from the ground, but used as mulch around the plants, and when this mulch is rotted it may be incorporated with the soil, where it will help to retain moisture and maintain the soil in a porous condition; this failing no amount of artificial fertilizers will be of much service.

In the north, where some attention is being paid to rubber growing, the idea is to plant rubber trees between the rows of bananas, so that the latter before being removed will more than pay the expense of establishing a rubber plantation. In such a case the bananas become the subsidiary crop and the rubber the permanent crop. Neither crop will do the other any injury as regards the exhaustion of plant food. The rubber tree roots deeply and draws most of its nourishment from a depth, and by the time it has sent forth its surface roots the bananas will be ready for removal.

THE SUGAR INDUSTRY IN QUEENSLAND.

According to the Australian correspondence of the Louisiana Planter (Vol. XLVI, No. 3) the sugar season for 1910 has been a very successful one for Australia. Preliminary figures based on the actual crushing and the amount of cane still in sight estimate an output of 207,300 tons from the State of Queensland, which is 33 per cent more than the actual figures in 1909. The area planted is approximately 100,000 acres (40,470 hectares), an increase of 20,000 acres (8,094 hectares) over 1909.

There has been an increased interest in the sugar industry, due partly to the substantial bounties offered and partly to the appointment of a commission which is to report on the question of government assistance toward the erection of central mills. About fifteen years ago the government advanced money to build a number of mills, but they made poor progress toward paying off their indebtedness until Dr. Walter Maxwell took the matter in hand and put the mills on their feet. Several of them were able to pay off their indebtedness and others are now on the way to doing so. The general unsatisfactory position of the mills for the time being created a feeling in the minds of those in authority against any further advances for new mills. But the demands have been so insistent from quite a number of localities, and the prospects for sugar growing are so good,

that it has been borne home to the ministers that unless Queensland moves in the matter other parts of the Commonwealth will do so; it has, therefore, been decided to erect several other mills in localities which the commission will select. The consumption of sugar is growing so rapidly that it will require a number of these mills to overtake it, seeing that it will be at least five years before they can get into full profit. In addition, a number of private mills are under way in various parts of the State, so that in the course of a year or two there should be little room for imported sugar, especially if the industry is started in the northern territory, which is in a tropical belt not yet properly opened up.

The article goes on to state that the shortage of labor which has been felt for some time is likely to increase. The State government is planning the construction of nearly 2,000 miles of railway, and this will involve the employment of a large number of men who might, under ordinary conditions, find work in the cane fields. It is thought that it will be necessary to secure labor from abroad or the sugar industry will suffer severely. However, it is hoped that this railway will open up large areas of land suitable for sugar cultivation and greatly increase the sugar industry.

MARKET REPORTS.

NOTES ON MANILA MARKETS FOR FEBRUARY.

By KER & Co.

(Based on advices from New York, January 23; San Francisco, January 28; London, February 2; Iloilo, February 21; Hongkong, February 25; Cebu, February 25).

SUGAR.

Iloilo.—Market has advanced smartly and closes firm at ₱7 per picul No. 1, ₱6.50 No. 2, and ₱5.50 No. 3. Crop is now estimated at 118,125 tons.

Manila.—Quoted at an advance of 50 cents per picul, say, ₱6.25 No. 1, ₱5.75 No. 2, and ₱5 No. 3.

Cebu.—Little doing. Quotations: ₱5.50, ₱5, and ₱4.50 per picul for Nos. 1 to 3.

HEMP.

Market has improved and we quote fair current for Europe ₱7.75 and for America ₱8.25 per picul f. o. b.

COPRA.

Closes steady at the reduced prices of ₱9.50 per picul Manila fair merchantable, and ₱10 per picul Cebu fair merchantable f. o. b.

DISTRIBUTION OF PRINCIPAL PHILIPPINE EXPORTS FOR THE TWO MONTHS, JANUARY TO FEBRUARY, 1911.

Products exported.	United States.	China.	Pacific coast.	Great Britain.	Continent of Europe.	Australia.	Japan.	Malay States and India.
Dry sugar (tons) -----		8,058						
Hemp (bales) -----	90,527	1,800	7,929	66,668	11,356	3,254	3,440	1,775
Copra (piculs) -----			14,400	5,600	151,554			
Cigars (thousands) ----	783	4,794	1,786	2,014	1,623	858	127	2,366

MANILA AND LONDON FIBER MARKET.

Manila hemp receipts and shipments.

(Telegram from Manila to London, March 13, 1911.)

	1911	1910
Hemp receipts at:	<i>Bales.</i>	<i>Bales.</i>
Manila since January 1	194, 866	180, 529
Cebu, etc., since January 31	67, 684	54, 859
All ports since January 1	262, 550	235, 388
Shipments by steamer to:		
United Kingdom, cleared since January 1	103, 739	46, 143
Atlantic coast, United States, cleared since January 1	85, 102	93, 024
Pacific coast, United States, cleared since January 1	29, 007	14, 987
Continental ports, cleared since January 1	20, 514	7, 873
Shipments to:		
All other ports	13, 434	
Local consumption since January 1	2, 000	
Loading steamer on the berth for the United Kingdom, about	15, 434	11, 842
Loading steamer on the berth for Atlantic Coast, United States, about	2, 000	30, 000
		12, 000

Bales of hemp loading for United Kingdom, by steamer :

Tean 2,000

Hemp arrivals at Manila during February, 1911.

Provinces.	Piculs.	Bales.
Albay	36, 958	18, 479
Sorsogon	16, 676	8, 338
Camarines	32, 672	16, 336
Leyte	15, 150	7, 575
Samar	13, 518	6, 759
Mindanao	8, 722	4, 361
Other districts	14, 300	7, 150
Cebu	6, 178	3, 089
Total	144, 174	72, 087

LONDON FIBER QUOTATIONS.

The following quotations on Manila hemp, sisal, and Philippine maguey are taken from the Weekly Market Report of Messrs. Landauer & Co., dated London, February 8, 1911.¹

MANILA HEMP.

	Spot and close by.	January to March.	March to May.
Best marks	42/- to 44/-	42/- to 43/-	42/- to 43/-
Good marks	40/- to 41/-	40/- to 41/-	40/- to 41/-
Good current	35/- to 36/-	35/- to 36/-	35/- to 35 1/2
25 per cent over current	22 1/2 to 23/-	21/- to 21 1/2	21/- to 21 1/2
Fair current	18 1/2 to 19/-	18 1/2 to 19/-	18 1/2 to 19/-
Superior seconds	18 1/2 to 18 1/2	18 1/2 to 18 1/2	18 1/2 to 18 1/2
Good seconds	18 1/2 to 18 1/2	18 1/2 to 18 1/2	18 1/2 to 18 1/2
Fair seconds	18 1/2 to 18 1/2	17 1/2 to 18 1/2	17 1/2 to 18 1/2
Good brown	18 1/2 to 18 1/2	17 1/2 to 17 1/2	17 1/2 to 17 1/2
Fair brown	18 1/2 to 18 1/2	17 1/2 to 17 1/2	17 1/2 to 17 1/2
Manila hemp strings	14 1/2 to 15/-	13/- to 13 1/2	12 1/2 to 13/-

¹ These quotations are in pounds and shillings English currency per ton. One pound equals about 10 pesos Philippine currency. One ton equals approximately 16 piculs.

Fine hemp has remained very firm and difficult to obtain. The few transactions that have taken place have been at full prices, and in some instances shippers have succeeded in obtaining an advance of 10 shillings to 15 shillings per ton.

Spot hemp is idle, fair current in dock selling at £18 5s. 5d. to £18 10s.

SISAL HEMP.

In New York the market is weaker, the price being $3\frac{3}{4}$ cents, equal to £19 c. i. f. Europe. A small volume of business has been done on this basis and in superior quality at £20 10s. to £20 15s. c. i. f. continental ports.

MANILA MAGUEY.

Dull. Quotations are £16 10s. No. 1, £15 No. 2, and £14 No. 3 February. April shipment.

ILOILO SUGAR MARKET FOR FEBRUARY.

By FIGUERAS HERMANOS.

Arrivals of the crop from the sugar mills during the month of February amounted to 323,900 piculs. There was a gradual increase in price from 5 pesos and 4 reales¹ on the 1st of the month, for assorted sugar, to 6 pesos and one-half real on the 28th.

February shipments.

Date.	Vessel.	Destination.	Superior.	Wet.
Feb. 4	Sungkiang -----	Hongkong -----	<i>Piculs.</i> 13, 926	<i>Piculs.</i>
Feb. 7	Ningpo -----	Ningpo and Chinkiang -----	35, 035	-----
Feb. 8	Taming -----	Cebu -----	2, 231	-----
	Total for February -----	-----	51, 192	-----

Exports up to March 5, 1911.

To—	1909-10 crop.		1910-11 crop.	
	Superior.	Wet.	Superior.	Wet.
United States -----	<i>Piculs.</i> 18, 400	<i>Piculs.</i>	<i>Piculs.</i> 33, 600	<i>Piculs.</i>
China -----	64, 575	-----	135, 972	29. 38
Total -----	82, 975	-----	169, 572	29. 38

¹ 1 real equals $12\frac{1}{2}$ centavos.

PRINCIPAL PHILIPPINE IMPORTS AND EXPORTS— FEBRUARY, 1911.

By the COLLECTOR OF CUSTOMS.

IMPORTS.

Articles.		Manila.	Cebu.	Iloilo.	Totals.
Rice	(Kilos	4, 431, 941	1, 333, 126	1, 870, 952	7, 636, 019
	(Value	\$138, 026	\$187, 021	\$65, 798	\$390, 845
Beef cattle	(Number	2, 742		122	2, 864
	(Value	\$44, 684		\$1, 679	\$46, 363
Eggs	(Dozen	276, 332	13	83	276, 428
	(Value	\$22, 808	\$5	\$10	\$22, 823
Sugar	(Kilos	215, 280	16, 424	53, 040	284, 744
	(Value	\$14, 489	\$1, 295	\$3, 566	\$19, 350
Coffee	(Kilos	15, 531			15, 531
	(Value	\$5, 002			\$5, 002
Cacao	(Kilos	49, 276	28, 111	140	77, 527
	(Value	\$13, 187	\$8, 178	\$94	\$21, 459
Raw cotton	(Kilos				
	(Value				

EXPORTS.

Hemp	(Kilos	5, 212, 576	2, 041, 404		7, 253, 980
	(Value	\$465, 403	\$176, 413		\$641, 816
Copra	(Kilos	3, 477, 615	1, 606, 991		5, 084, 606
	(Value	\$293, 820	\$170, 868		\$464, 688
Sugar	(Kilos	1, 539, 726			1, 539, 726
	(Value	\$60, 474			\$60, 474
Cigars	(Thousand	7, 556			7, 556
	(Value	\$106, 999			\$106, 999
Cigarettes	(Thousand	1, 295			1, 295
	(Value	\$1, 044			\$1, 044
Tobacco	(Kilos	1, 136, 617			1, 136, 617
	(Value	\$170, 484			\$170, 484

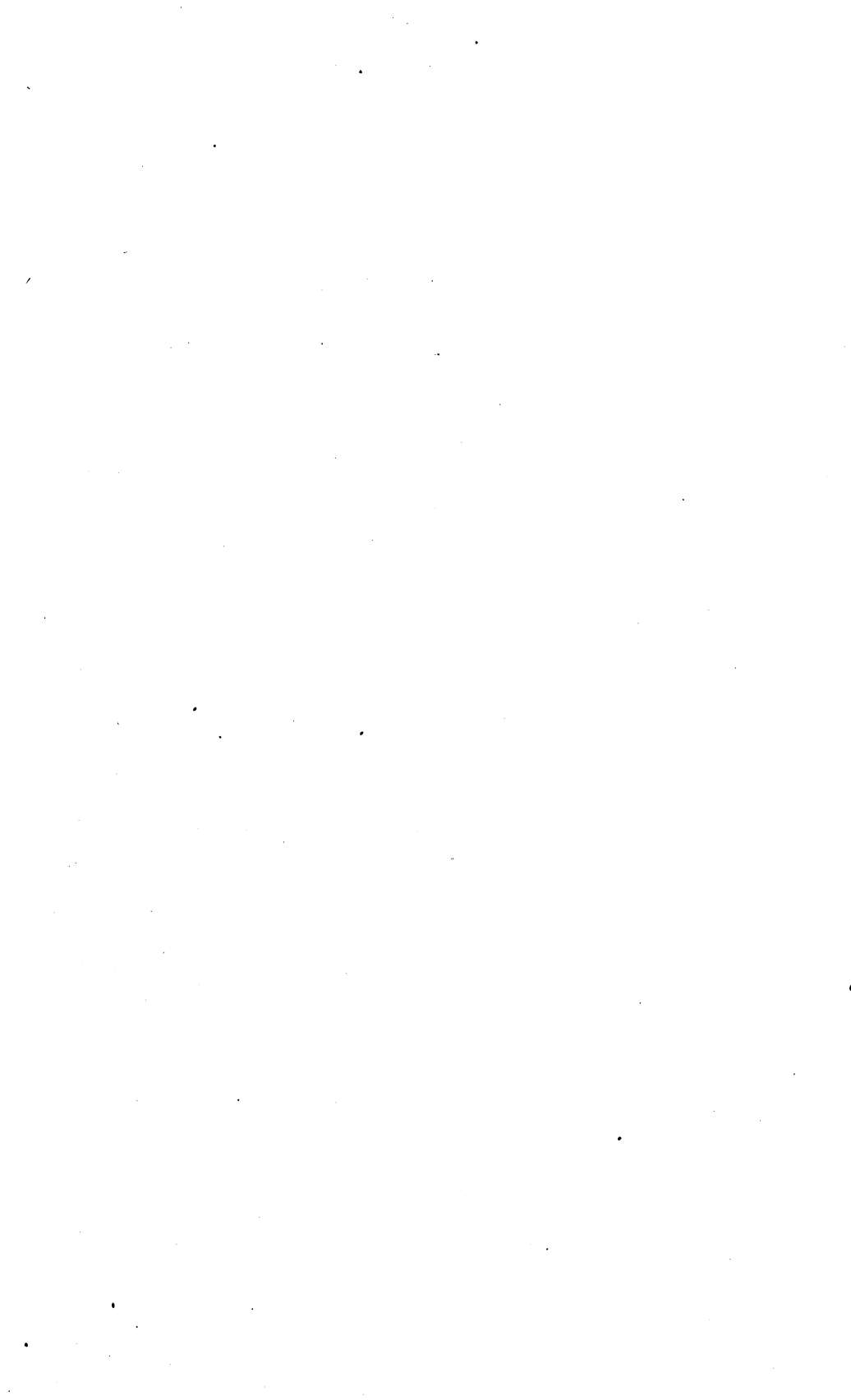
TEMPERATURE AND RAINFALL FOR AGRICULTURAL DISTRICTS IN THE PHILIPPINES.

By the DIRECTOR OF THE WEATHER BUREAU.

FEBRUARY, 1911.

[Temperature and total rainfall for twenty-four hours beginning at 6 a. m. each day.]

Date.	Hemp.				Sugar, Iloilo.		Rice, Tarlac.		Tobacco.			
	Albay.		Tacloban.		Temperature.	Rainfall.	Temperature.	Rainfall.	Aparri.		San Fernando.	
	Temperature.	Rainfall.	Temperature.	Rainfall.					Temperature.	Rainfall.	Temperature.	Rainfall.
	°C.	mm.	°C.	mm.	°C.	mm.	°C.	mm.	°C.	mm.	°C.	mm.
1	26.9		26.5		26.8		27.4		25.8		27.1	
2	25.2		26.1		24.6		28.8		25.5	3.3	26.4	
3	27		26.5		25.6		28.2		23.4	72.3	25.2	
4	26.4	14	26.5	.8	26.6		27.7	25.4	22.2	21.7	25.2	
5	26.9	1	27	4.6	26.4		26.3		23.2	4.7	26	
6	26	19.8	24.7	82.1	24.5	.6	26.9		22.9		26	
7	26.4	2.5	24	67.1	24.1	13.9	26.4		21.7		26.2	
8	26.5		24.7		24.8		27.2		22.9	10.7	26.6	
9	26.9		24.8	22.1	25.1	.5	27.1		23		24.8	
10	25.6	47.8	26.2	.5	25.1	1.8	26.6		23.8	16.5	25	
11	25.6	19.6	25.8	26.2	26.1		26.4	3.8	23.6	13.5	24.7	1.5
12	24.8	25.4	24.7	46.4	25.9	19	25.8		24.1		26	.5
13	25.2	10.1	25.3	4.8	24.5		27		23.8		25.9	
14	25	12.2	24.6	8.1	24.5	16	26		23.3		24.8	
15	24.9	8.2	25.1	3.3	24.7	.3	27		23.7		24.7	
16	25.2	16	25.8	.8	26		27.6		23.3	1.8	25.6	
17	26.1		26.3	.8	25.6	4.1	27		22.4	5.5	26	
18	25.5	65	25.8	.8	26.3	.3	28		22.4	.3	26.2	
19	23.4	27.4	24.9	17	24.3	19	27.4		22.4	1.3	26.6	
20	23.5	58.2	24.4	27.9	24	1.5	26.4		21.4	9.1	25.2	
21	23.8	23.9	24.1		24.7		26.2		22.4		25.2	
22	24.7		25.1	1.3	25.8		26.4		21.6		25	
23	25.5		25.4	1	26.2		27		22.3	8.2	23.8	
24	25.5	.5	25.7		25.7		25.8		22.1	1.6	23.6	
25	24.8	16.8	26.1		26.8		26.2		23	7.8	24.2	
26	24	9.2	26.2	.5	25.6		26.8		21.8	11.9	24.7	
27	25.3	.8	26.1	1.5	26.2		27.8		22.3		25.4	
28	25.7		27.2	2.5	27		26.5		22.8	1.4	25.7	



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EDITORIAL.

THE RINDERPEST SITUATION AND THE PEOPLE.

We are publishing in this number of the REVIEW five articles relating to the animal-disease problem in the Philippines. In no single number of the REVIEW previously issued has it been

possible to present so much material on this subject, and at no time during recent years has this question been of more vital importance to the people of these Islands than it is to-day.

With more adequate means at hand for fighting rinderpest than have ever before been available, an active campaign is now being waged against this disease both on Luzon and in the Visayan Islands. His Excellency the Governor-General, the Commanding General of the Philippines Division, and the officials of the Executive Bureau and the Bureau of Constabulary are extending to the Bureau of Agriculture all possible assistance in this work. A large force of Philippine Scouts and Constabulary has been detailed for quarantine service and a number of Army veterinarians and farriers are now assisting the veterinarians of the Bureau of Agriculture.

Provision has been made for the slaughter of infected animals and for the reimbursement of the owners of animals so slaughtered. Every effort is being made by the Chief Executive and by the officials of the Bureau of Agriculture to accomplish the desired result, which is the complete eradication of rinderpest, with as little inconvenience and loss as possible to the owners of live stock.

It may be well to note in this connection that the officials above-mentioned, the veterinarians, and the inspectors constitute but a small body of men, as compared with the thousands of cattle owners and the total population of the Islands. These men are but the leaders, the organizers, and the agents who are directing and carrying on the campaign. It is a self-evident fact that the live-stock owners, the farmers, and the people constitute by far the larger part of the equation in this problem. The campaign which is being carried on is primarily for their benefit, so naturally it may be expected that they will assist in every way possible in this work.

In the control and eradication of rinderpest and other animal diseases there is no more important factor than the support and coöperation of the people. It is their duty to learn the means of detecting disease in its first stages, to know what steps should be taken to save infected animals, and to guard against the spread of disease to other animals. It is only when the cattle owners and farmers understand these matters and coöperate intelligently with those who are directing this work that we can hope to rid the country from rinderpest.

The attention of our readers is invited to the address of His Excellency the Governor-General at the Third Annual Meeting of the Philippine Veterinary Medical Association, published in this number of the REVIEW. This address clearly outlines the

importance of the animal-disease problem to the Filipino people. Attention is also invited to the article by Dr. C. G. Thomson, which gives an outline of the work done in the district of Davao in the Moro Province. This report by Doctor Thomson is not only an account of an up-to-date and progressive campaign against rinderpest but is, also, a record of the coöperation and support of the officials and people of Davao in this work. Without such coöperation and support the results which were attained would have been impossible.

We can not too earnestly urge upon the people of these Islands that their hearty support be given to the small body of men who are directing the work of eradicating rinderpest. This support is absolutely essential if the best results and largest successes possible are to be attained. Every live-stock owner should not only take necessary precautions himself to guard the health of his domestic animals but should also disseminate among his neighbors information on this subject. With the united effort of the different forces that are now engaged in the campaign against rinderpest, aided by the support of the people, there can be but little question as to the successful issue of this campaign.

AGRICULTURAL DEVELOPMENT IN THE PHILIPPINES AND AGRICULTURAL ASSOCIATIONS.

One of the most important subjects discussed at the agricultural conferences held during the last Philippine Carnival was "The Necessity of Coöperation Among Philippine Farmers" and the closely related subject, "The Importance of Agricultural Associations for the Provinces."

Schools, public works, and other improvements have become so prominent as to bring the present methods of agricultural work in the Philippines into striking contrast. Conservatism is a typical characteristic of the farmer in every land, and no one can blame him for being conservative until he has been convinced that there are better ways and methods, better means and larger results to be obtained than those obtained by the means and methods which he has employed in time past. However, the time has arrived when the farmers should realize that they are the most important factor in the industrial and commercial development of the Islands.

That, "In unity there is strength," is a truth which needs to be emphasized. At present there is little unity, coöperation, or organization among the farmers in the Philippines. The good results possible from intelligent organization can

scarcely be overestimated. Organization offers to the farmers the opportunity for making their needs known to the Government, for protecting themselves against unjust practices, and for the best and largest development of their business. Until the farmers of the Islands become active and united, and begin to take an energetic part in abolishing bad practices and in working for laws which provide for the agricultural development of the country but little can be hoped for in the way of increased production and increased profits from the farms. In this number of the REVIEW we are publishing the constitution and by-laws of the Insular Agricultural Association, and from time to time suggestions and outlines of the work for associations in the provinces will be presented.

STATISTICAL MAPS ON PHILIPPINE CROPS.

We are publishing, on pages 249 and 251, reductions of statistical maps showing the production, by provinces, of rice and hemp in the Philippines. Six maps were prepared for the 1911 Carnival to show the localities where the six principal crops were grown in the Philippines during the fiscal year 1910, the darker shades showing the heavier growth. The other maps will be reproduced in subsequent issues of the REVIEW.

The province has been taken as the unit, it being impracticable to take municipalities of which there are, with townships and *rancherías*, upwards of 800. The reports furnished by municipalities form the basis of the material from which these maps were prepared. It will be noted that the fiscal year 1910 marked the beginning of the good results which have followed the passage of Act No. 1898, making it the duty of all municipal presidents to furnish quarterly reports upon crops and live stock. It is due to their work and the data furnished by them to the Bureau of Agriculture that the preparation of fairly correct maps has been possible. While the method of adopting a provincial unit does not give as exact information as would the using of smaller political divisions, it was thought that the general public would wish to know what provinces were the principal producers of any particular crop, regardless of their superficial area.

On the opposite pages from the maps the production and area under cultivation in each province is given. Any one wishing to go into the matter in greater detail can obtain from the Bureau of Agriculture the area planted and the production of any of the principal crops, by municipalities.

A DECLARATION AND QUARANTINE ORDER REGARD-
ING RINDERPEST IN CERTAIN PROVINCES.

BAGUIO, *March 21, 1911.*

In accordance with the provisions of section 5 of Act No. 1760, I hereby declare that the dangerous communicable animal disease rinderpest prevails in the Provinces of Cagayan, Isabela, Pangasinan, Tarlac, Nueva Ecija, Pampanga, and Bulacan, and that it is unlawful to remove animals susceptible to rinderpest, including cattle, carabaos, sheep, goats, swine, and deer, from any of the above-mentioned provinces without a certificate issued by authority of the Director of Agriculture.

W. CAMERON FORBES,
Acting Secretary of Public Instruction.

ADDRESS OF WELCOME DELIVERED AT THE THIRD
ANNUAL MEETING OF THE PHILIPPINE VETERI-
NARY MEDICAL ASSOCIATION.

By the GOVERNOR-GENERAL.

I am glad to take an opportunity to speak to the veterinarians in convention because I am so intensely interested in the result of their work. In my judgment there is no body of men in these Islands engaged in a work more necessary or vital to the progress of the Philippine Islands than is the work of the veterinarians of the Bureau of Agriculture to-day. The agricultural, industrial, and commercial existence of the country depends upon it. If you do not succeed in the work which you are now doing in suppressing animal disease in the Islands, especially rinderpest and surra, I can not see how the Philippine people are going to raise themselves from the agricultural depression from which they have suffered for the past ten years.

The value of the draft animal to the community can be calculated in three ways: First, the cash value of the animal, which runs into many millions of pesos but is really only incidental to the second value, which is his work in cultivation and transportation, and the third value is his value for beef purposes. The Philippine people are now importing their beef from foreign countries when they could perfectly well raise it.

The road work which is being carried on by the Department of Commerce and Police and the general improvement of transportation throughout the Islands, especially railroad construction, has had the effect of liberating the carabao from much of the transportation work for which he was used previously and enabling him to go to the fields. One carabao can haul much more over good roads than over bad, and can travel faster; and I have no hesitation in saying that the efficiency of the carabao for the purpose of transportation has increased from 400 to 1,000 per cent over what it was before this road campaign went into effect.

Elaborating a little on the importance of the draft animal from the point of view of meat supply, in this country of great heat and slow transportation meat will not keep more than a few hours and it is necessary for animals to be slaughtered where they are consumed and for the consumption to take place immediately. It is therefore imperative for the Philippine people to raise their own meat supply if the people outside of the great centers of population, where there are cold-storage facilities and imported animals are bought, are to have meat.

As an article of diet meat is also important from the point of view of improving the physique of the people, which in turn would enable them to work better.

While the risk of losing the capital invested, by reason of rinderpest or any other cattle disease, is an imminent one, and while the problem remains unsolved, we can not expect the people to invest their money in raising large quantities of cattle in the Philippine Islands. If you can have the cattle safely guarded and put in a pasture in which you can practically insure the owner of the cattle that it is not infected with contagion, or should the contagion appear, you are able to inform him immediately of the first case and that the thing can be prevented by the adoption of certain rules, that day we are going to have animals that instead of being slaughtered will form the nucleus of the great herds which ought to be roaming all over the hills and fields of our Islands. I have visited a great many provinces in the Islands, and I have traveled quite a good distance by bull cart, carromata, steam launch, etc., and I have seen the grazing lands very generally bare of cattle, and I want to say to you all that, as a business man, if I were looking for investments I would avoid the business of raising cattle in the Philippine Islands. It is our duty, however, to change conditions so that a man can be confident that he is not liable to lose his whole principal when put into cattle. It is very important that a definite policy be established and agreed upon by all hands; not only agreed upon but thoroughly believed in. A man does better when he is working on a system that he thoroughly believes in, and for that reason I approve of the convention of veterinarians, as it is a means of bringing together the people of different views, different experiences, and giving them an opportunity to compare their experiences, adjust their differences, argue out their different theories, and finally reach a conclusion as to the best method of coping with the situation, and thus reinforced each of you will return to

his work with fresh impetus, fresh enthusiasm, and new ideas and knowledge.

We are most fortunate in having just now at the head of the Army in the Philippine Islands, at this particular juncture, General Bell, who has come out here with the determination to make things go. He looks at things in a large way. He has not lost any of his former enthusiasm now. When I told him about the conditions here as regards the rinderpest situation, and when I then asked him for Scouts to help us out, he at once said "Yes," and things are being arranged so that we can have Scouts to help us.

The history of our work in the fighting of rinderpest up to now is a history of a series of experiments, valuable and instructive, but it is not the history of a big, adequate campaign undertaken with the necessary men and money to really hope to cope with the situation so trying as that with which we have been all this time confronted. In view of the fact that some of these efforts have been of an experimental nature and have not succeeded it is not to be expected that the Filipino will have acquired a complete confidence in the measures of the Bureau and the measures of the Government. It is to be expected that he will very naturally and very probably be inclined to hold off a little bit and take the suggestions of the Government with a grain of salt. In view of the fact that errors have been made in some particulars by the Government, it is our duty now to be extremely patient in our effort to establish our new system of combating the disease by quarantine, to hear with sympathetic ears the complaints and objections of the people affected, and to so conduct the campaign as to interfere as little as possible with the agricultural and industrial work of the country.

The Constabulary at one time were paying their officers too little and were not getting the best class of men. They became very unpopular with the Filipino people. A good deal of power was put into the hands of these men who were not of sufficient moral fiber to withstand temptations. There were a good many complaints made against them as a result. These complaints were sometimes referred to the very officers in question, who would whitewash themselves. When I first came to the Islands there was a very general feeling among the people against the Constabulary. In the provinces it was quite common for a Constabulary officer to send one of his men with an escort, to ask the president of the municipality to call upon

him. Perhaps at that time the officer was only a third lieutenant who might be a new arrival from the States. All this was entirely unnecessary. As a matter of courtesy the Constabulary officer ought to have called on the president himself in his office, he being the chief executive in the town, it was an abuse of his position for the Constabulary officer, whoever he was, to have sent for him to come. He ought to have gone to him. These new men did not all know the language to begin with. Almost all misunderstandings between people arise from the misunderstanding of words. How many times are they multiplied where the people do not use the same language? For that reason I want to impress upon you all the necessity of learning local dialects and the Spanish language. Get busy and learn the language of the people you are seeing. It is very easy to say, "Let them learn our own language." They will not. You will not find them to be a people that will get busy and learn your language. You are the intruder. You should learn their language. The man who will make the biggest success in his district is the man with two-thirds ability to get on with the natives and one-third of technical ability. To get the coöperation of the people you should be able to communicate with them. It all amounts to using a little tact and courtesy with them. Try to render little services to the people, treat them in a courteous and kindly way; that is something that the Filipino responds to more than any one thing. If you can render them little services, if you have done something for them, they will remember that act and will turn to you and help you and you will find that they are your friends. What you want to do is to get every single card in your hands, and the respect and affection of the people with whom we are dealing is the most important single asset in carrying out a successful campaign for clearing up the rinderpest in any single district that you may be in. Instill in your subordinates the conviction that what is expected of them is hearty coöperation with the people. This may seem a little bit in conflict with the necessity of reporting against certain officials in case they fail to assist you in your work. In case you fail to get assistance from some official, and in case you meet with hostility to the measures of the Bureau, you may have to report him to your chief, who will in turn report him to me and I will put the screws on. I have gone so far as to remove certain provincial and municipal officers; I have suspended officers; I have reprimanded a considerable number, and I have written

letters of suggestion urging them that assistance be given from time to time.

In conclusion I want to thank you all for your attention, and I hope that the result of this meeting will be the united efforts on the part of everyone present to cope to the utmost with this mighty problem.

RESPONSE BY THE DIRECTOR OF AGRICULTURE.

It is with a feeling of pride that I appear as your representative to make the response to this address of welcome. This pleasure is heightened by the fact that I had the honor of bringing together the forces which were united to form this association, composed of men who are engaged in two distinct lines of veterinary work in the Philippines which are vitally connected with the two branches of the Government—the Federal and the Insular. There could not be a more auspicious occasion on which to say a few things which have remained unsaid for many years, and I hope to bring them out this morning so as to lead to a better understanding between us and those to whom we are responsible.

The problems presented to those associated with the Army in the Philippines are different from those confronting the Insular veterinary service. In the Army, veterinarians deal largely with problems pertaining to the management of American mules and horses, and the work is much the same as in the United States. I shall deal primarily with those things that pertain to the diseases of the Philippines which concern the Insular Government rather than the military.

The veterinarians of the quartermaster's department first directed attention to the prevalence, to the seriousness, and to the best means of combating the diseases with which we are dealing to-day, particularly of surra and rinderpest, while foot-and-mouth disease was regarded as of secondary importance. Those of you who have read former yearbooks and reports of the Department of Agriculture and the Bureau of Animal Industry remember those descriptions of the treatment of horses for surra in the early days. With your present knowledge of the disease you would not use those methods now. At one time the city of Manila had for a veterinary inspector of the port a quartermaster veterinarian who had never seen a case of rinderpest and who had only a theoretical knowledge from books. The disease was being imported on almost every ship that came here until a large cargo came one day and so many animals were

dead on board the steamer that it could not but attract attention. From that day we have realized that one of the greatest problems confronting the Insular Government has been to prevent the constant importation of contagious diseases from outside countries, and far more important than that is the spread of those same diseases within our territory. Not long ago I was reading a speech made before the Congress of the United States and found in it a statement to the effect that the Bureau of Agriculture had had an existence of about eight years, and notwithstanding this long time to work out the problems for the suppression of these animal diseases, the Bureau of Agriculture had made a failure of it and that the diseases were as bad to-day as they had ever been. There were several errors in that speech. The fact that the Bureau of Agriculture has been organized that long does not mean that it is responsible for those diseases prevalent during the time the veterinary work was in the hands of the Bureau of Science or the Board of Health. The Bureau was not responsible for this work at any time or in any manner prior to November 1, 1905.

At the time the man who has just given you this excellent address was placed in the chair of Governor-General, the conditions were practically as bad as they had been at any time in the past. It is true that a smaller amount of disease existed then than to-day, but the fact remains that the diseases were here, extensively distributed and wreaking the most terrible destruction upon the animal life of this country. That fact and the general failure to remedy the condition has given rise to the belief that you gentlemen, representatives of the Bureau of Agriculture as veterinarians, have been at a disagreement as to how to proceed. Since November 1, 1905, there has been no disagreement among the veterinarians of the Bureau of Agriculture as to the methods to be followed to gain the desired end. There has been one lone object in view and that has been *the absolute extermination of these diseases*. Palliative measures will never give satisfactory results. We have absolute faith in our ability to accomplish what we have set out to do. The live-stock industry in the past has been uncertain and is to-day in that condition which insurance companies would classify as "extra hazardous." I have just returned from a southern trip in which I have seen the conditions as I have never seen them before. A gentleman a few years ago started, in Davao, a herd of cattle. He increased his herd to 700 head and made a living for himself. A few weeks ago rinderpest was introduced into

that district, his herd was the first to get the infection, and in two weeks it was destroyed. The work of seven years was absolutely wiped out. There is no assurance against these occurrences under the conditions that exist to-day. I think that the Philippines are particularly fortunate in having at the helm of the Government to-day a man who is capable from his long and intense business training of hearing the business side of this question and viewing it from the standpoint of success or failure in business and seeing the commercial importance of this question in its relation to the industries, the trade, and the future development of this country. He has set himself the task of finding out the causes for the presence of these plagues and the means by which we can get rid of them. He is the first man in the responsible post which he occupies who has been able to see these things as he has seen them, and whenever you have success in the extermination of rinderpest or surra as you have had already in foot-and-mouth disease, you can give a large part of the credit to the man who first saw the business side of this question. The first consideration after the problem was placed before him was, "What do you need to effect the desired result?" When he got the answer it was divided into three branches. First, financial support. This Governor-General did not wait for anything but went to the Treasury and obtained the money for an enlarged veterinary force and started the campaign. He has received the hearty applause of all who have known the great value of this measure. He has given you the means of doing what you were unable to do before from lack of financial support. Second, the adoption of a policy which established a means of controlling these diseases along sanitary lines long since approved all over the world where veterinary science is a recognized profession. When you are going to stop a disease affecting an animal the only common-sense thing to do is to stop the movements of that animal and limit the infection to a small center. The Governor-General has provided the means of carrying out a successful sanitary campaign. Third, the liberal use of the police power in the veterinary work, which is the key to the situation to-day, the one thing which will give success if the present policy is carried forward. I have just made a trip through districts that three months ago were just riddled with disease. In Leyte, after circling around that island and touching at several ports where disease had formerly existed, we found that no cases had occurred for a week or more.

I would like very much to say a great many things along this line and to recount a great many of the successes in detail. I regret very much that through lack of time we were unable to call in a great many patient workers of the veterinary force. I hope that you who are present will carry to them a message of good cheer. Tell them, when you go back, that the Governor-General is standing right back of the veterinary force with all the support that he can command. I thank you all for your attention, and hope you will have a series of pleasant and profitable sessions.

THE THIRD ANNUAL MEETING OF THE PHILIPPINE
VETERINARY MEDICAL ASSOCIATION, MANILA,
FEBRUARY 25 AND 27, 1911.

By Dr. DAVID C. KRETZER,
Secretary-Treasurer of the Association.

The Third Annual Meeting of the Philippine Veterinary Medical Association was held at the Young Men's Christian Association building, Manila, commencing at 10 a. m. on Saturday, February 25, 1911.

The meeting was called to order by the president, Dr. W. P. Hill, who reviewed the work which had already been accomplished by the veterinarians in the Philippines, and emphasized the importance of coöperation and organization, and suggested that measures be taken to regulate the practice of veterinary medicine and surgery in the Philippine Islands.

In a few appropriate words the president introduced His Excellency the Governor-General as the first speaker. His Excellency addressed the meeting, reminding the veterinarians of the importance of their work, and the necessity of the elimination of dangerous communicable animal diseases, in order that the agricultural industry in these Islands might be developed, all of which is so vital to the prosperity of the Filipinos. The Governor-General is taking a keen personal interest in the ultimate success of the veterinarians in the Archipelago, thereby encouraging them to greater, if possible, or at least renewed efforts with a firmer determination to conquer, in the face of almost insurmountable difficulties, the dangerous animal diseases existing in these Islands.¹

In response to the Governor-General's address, the Director of Agriculture enumerated some of the difficulties that had been encountered in the past by the Bureau of Agriculture in its efforts to suppress and eventually eliminate diseases among

¹The address of the Governor-General and that of the Director of Agriculture are published elsewhere in this number.

the animals in the Islands, and pointed out some of the essential requisites necessary to carry on successfully the work already started and to terminate the campaign at the earliest possible moment. Doctor Nesom concluded his remarks with an expression of appreciation for the words of encouragement with which His Excellency had favored the association.

Dr. W. H. Boynton, pathologist, Bureau of Agriculture, gave an interesting and instructive discourse on the subject of pleuropneumonia, illustrating his lecture by means of diagrams, photographs, and pathological specimens, showing the various phases of the disease.

Doctor Boynton was followed in his remarks by Dr. David McKibbin, who read a paper on osteoporosis, citing certain cases that had come under his personal observation at the Trinidad stock farm, near Baguio, subprovince of Benguet, which are probably the first authentic cases that have been reported in the Philippine Islands.

An extremely interesting talk was given by Dr. Archibald R. Ward, chief veterinarian of the Bureau of Agriculture, on appropriate and practical methods in dealing with rinderpest, with a view to eliminating eventually this dread scourge which has demoralized the agricultural industry of the Islands. Doctor Ward dwelt at length upon the results obtained by the use of the simultaneous method of inoculation, as compared with the antirinderpest serum inoculation alone, and enumerated some of the obstacles in attempting to carry out the former method of inoculation in the Islands. Doctor Ward advocated the destruction of all animals sick with rinderpest, and, in certain instances, susceptible animals that have been exposed to the disease, together with rigid quarantine, isolation, and thorough disinfection, as being the only measures known at present which are practical in dealing with rinderpest in the Philippine Islands. These conclusions were concurred in by a majority, if not all, of the veterinarians present. The methods above mentioned were successfully practiced in Europe one hundred and fifty years ago.

After some discussion on the subject, it was unanimously decided to give a banquet at the Hotel de Francia at 6.30 o'clock Sunday evening, February 26, 1911.

In view of there being many other important subjects to be discussed, and owing to the lateness of the hour the meeting adjourned to meet at 10 a. m. on Monday, February 27, 1911.

Sunday evening about thirty members of the association and several distinguished visitors met at the Hotel de Francia, where,

after an enjoyable dinner, the following speakers were introduced in a few appropriate and well-chosen words by the toastmaster, Dr. G. E. Nesom, Director of Agriculture.

The president of the association, Dr. W. P. Hill, veterinarian, Second Field Artillery, United States Army, stated that at the present time the veterinarians in the military branch of the service are not receiving the proper recognition by the Federal Government, and that all former efforts to have this branch of the service properly recognized had been defeated; he urged that each member of the association exercise his personal influence toward securing necessary legislation, to the end that veterinarians of the United States Army be given the rank which they deserve.

Dr. Archibald R. Ward, chief veterinarian, Bureau of Agriculture, dwelt particularly upon the necessity of rigid measures being adopted in order to suppress and eliminate rinderpest in the Archipelago; stating that it would be advantageous, in addition to the Philippine Constabulary, to obtain the aid of the military authorities by utilizing Philippine Scouts in maintaining an effective quarantine in those areas where rinderpest exists; that certain legislative and financial coöperation is urgently needed; and that the Insular Government should assume the responsibility in dealing with dangerous communicable animal diseases in the Archipelago, thereby relieving the provincial and municipal governments, as much as possible, of such authority. He cited instances of failures of the local authorities to cope successfully with such diseases, and he also recommended that the owners of diseased animals be compensated for animals killed in the interest of the public welfare.

Prof. C. V. Piper, Agrostologist, United States Department of Agriculture, at present in the Islands investigating the forage question, spoke entertainingly of his first impressions of the Islands, and dwelt at some length upon the wonderful agricultural possibilities of the Tropics.

The association was next favored with an address by His Excellency Governor-General Forbes, who enumerated some of the difficulties that might be encountered in obtaining for the Bureau of Agriculture the desired financial and legislative assistance, but stated that he would do all in his power to aid the Bureau to suppress and eliminate the dangerous animal diseases in the Islands. Such assurance, coming as it did from the Chief Executive, was very gratifying to the Association; and, as a result, every veterinarian present will return to his station with a firmer determination than ever to eradicate rinderpest in the Philippine Islands.

After these speakers had concluded their remarks the toastmaster, Doctor Nesom, in a manner no less pleasing than it was earnest, expressed the thanks of the association for the interesting talks with which it had been favored. In reply to the address of the Governor-General, Doctor Nesom assured His Excellency of the appreciation felt by him for the personal interest displayed in the work of the Bureau of Agriculture.

The closing session was held at 10 a. m. Monday, February 27, 1911.

Mr. M. B. Mitzmain, veterinary entomologist, Bureau of Agriculture, read a carefully prepared and interesting paper on the various methods by which certain diseases are disseminated by different varieties of insects, with special reference to the methods of conveying surra.

Dr. Alvin Broerman, instructor in anatomy in the College of Veterinary Science, University of the Philippines, which has been recently established in Manila, stated that a course of study is being given, extending over a period of five years; the requirements for admission being a high-school degree. Attention was called to the fact that during the recent session of the Philippine Legislature, provision was made for ten scholarships for students in the Veterinary College. This will give deserving Filipinos opportunity to become trained in a profession of vital importance to the prosperity of the country.

Dr. W. P. Hill, president of the association, gave an interesting talk on practical surgery, referring particularly to surgery of the horse's foot. He pointed out that very extensive operations involving the removal of large portions of the hoof, could be carried out without permanent injury.

Dr. Stanton Youngberg, traveling veterinary inspector for Luzon, gave an interesting talk on his personal observations of rinderpest in the provinces, citing cases he had seen where hogs had contracted rinderpest and then conveyed the disease to cattle; he stated that under certain rare conditions rinderpest infection apparently remains virulent for months. The remarks brought out a discussion by Doctors Ward, Boynton, Hill, McKibbin, and Decker.

Dr. Frank C. Gearhart, chief of the division of animal husbandry, formerly acting chief veterinarian, Bureau of Agriculture, stated that during his tenure of office as acting chief veterinarian the antirinderpest serum treatment was about the only measure that could be practiced at that time; that the more satisfactory measures in vogue to-day were not favorably regarded at that time, owing to conditions over which he had

no control; that it was his opinion then, as it is now, that the only practical means by which rinderpest may be eliminated is the one now advocated by Doctor Ward, and practiced, so far as possible, by the Bureau of Agriculture.

Doctor Gearhart suggested that the veterinarians from the provinces exercise their influence with the representatives of the people in their various districts, urging that the necessary legislation be enacted, and appropriations be made, with which to reimburse the owners of animals which it is found necessary to kill in the interest of the public welfare. The suggestions of Doctor Gearhart were well received by the members of the association.

The election of officers took place and resulted as follows: President, Dr. Archibald R. Ward; vice-president, Dr. Joseph Jefferes, veterinarian, Seventh Cavalry, United States Army; secretary-treasurer, Dr. David C. Kretzer.

The secretary of the association was instructed to notify Dr. Joseph Jefferes of his election, upon his arrival in the Islands on the next United States Army transport.

As there was no more business to come before the association, it was moved and seconded that the meeting adjourn to meet at the call of the president.

BAGUIO, BENGUET, *April 20, 1911.*

It was moved by Doctor Ward and seconded that the following resolution prepared by Dr. G. E. Nesom and Dr. F. C. Gearhart, committee on resolutions, be accepted by the association. The motion was unanimously carried.

RESOLUTION.

Whereas His Excellency the Governor-General has at all times given both his official and personal support to the members of the veterinary profession in the Philippines; and

Whereas his keen and sympathetic interest in the work of this association has been a stimulus to its individual members to renewed efforts in the great task which they have undertaken in these Islands: Therefore, be it

Resolved, That we, the members of the Philippine Veterinary Medical Association, do hereby express our appreciation for this support, this interest, and the very gracious consideration with which this association has been favored by His Excellency; and be it

Further resolved, That this resolution be made a part of the regular minutes of the annual meeting of this association and that a copy be sent to His Excellency the Governor-General.

REPORT ON THE RECENT OUTBREAK OF RINDERPEST IN THE DISTRICT OF DAVAO, MINDANAO.

By C. G. THOMSON, D. V. M.

In accordance with travel orders dated December 3, 1910, I sailed from Manila with Mr. R. E. Burris on the United States Army transport *Seward* on December 4, and arrived at Zamboanga on December 7. I immediately presented my letter of introduction to Brig. Gen. John J. Pershing, governor of the Moro Province, and in conference with him and Colonel Richards, the provincial health officer, discussed the Davao situation at some length. Very little was known in Zamboanga at that time as to the nature or extent of the outbreak, but both Brigadier-General Pershing and Colonel Richards realized the menace presented by the existence of rinderpest infection in the Moro Province and assured me that they would support us in any reasonable measures which we might recommend, providing such measures offered some hope of success.

With Brigadier-General Pershing we sailed on the U. S. Army cutter *Samar* on December 10, arriving at Davao December 14. After several days spent in studying local conditions as to the extent of the infection, distribution of susceptible animals, avenues of animal travel, and the distribution of Scouts and Constabulary for quarantine work, I submitted a letter to the governor of the Moro Province recommending that the sum of ₱7,500 be made available for transportation and indemnification of owners for slaughtered animals. In response I was informed that no funds could be made available at that time for the purpose of indemnification, but authorization was made for reasonable expenditures for transportation. I secured a small launch and used it almost constantly during my stay in Davao.

In the letter to the governor of the Moro Province, above mentioned, I submitted copies of ordinances covering certain quarantine provisions necessitated by local conditions and not anticipated in Act No. 1760 or the acts of the Moro Province.

Emergency health ordinance No. 1, passed by the provincial board of health on January 1, 1911, covered the desired points.

After a very careful study of the situation, I became convinced that only by the most drastic measures could the eradication of the infection be accomplished. The outbreak had already encompassed an area of over 150 square miles. The infection was of the most virulent type, and the rugged nature of the country made operations difficult in the extreme. Accordingly, fortified with the Insular and provincial laws, we proceeded to institute and enforce the most rigid restriction of the movement of all classes of domestic animals, to kill all animals found infected and other susceptible animals considered as being directly exposed to infection. My first concern was to guard against further spread of the disease. This was accomplished by establishing a series of Scout patrols well beyond the most remote known infections, to prevent the escape of any animal from within the infected zone. Detachments of Scouts were then stationed in the barrios within the infected area to tie up or corral every carabao, head of cattle, horse, pig, goat, and dog. Before taking stations the quarantine detachments were given brief instructions as to the nature of the disease, conditions tending toward its spread, and the nature of their duties, which consisted, briefly, in taking an accurate census of all classes of domestic animals in their districts, securing them in corrals or by ropes, and inspections twice daily to insure against their movement and detect infection. From certain barrios detachments were sent morning and afternoon to patrol the trails running from the coast to the mountains, in order to prevent the movement of animals north or south. Written reports were submitted at my office in Davao every Wednesday and Saturday, and an immediate report was made of new developments of any nature.

The quarantine regulations provided for the absolute restriction of the movement of animals within the infected area excepting in the town of Davao, where horses and dogs were permitted in the streets. It was desirable to permit the use of horses because practically all of the shipping interests are centered in Davao, it was therefore, necessary to make some provision for the transportation of merchandise. Very little hardship or inconvenience was caused by rigid quarantine in the outlying districts, as most of the towns and plantations are located on the shores of the Gulf of Davao, and transportation is mostly by launch or native boat. The *hacenderos* did not suffer through the enforced idleness of their carabaos and cattle,

as very little land is cultivated. I considered it best to tie up horses and dogs outside of the town of Davao because they present some little danger as infection carriers, and in view of the drastic measures taken we could not afford to overlook even such agents of infection.

I made inspections of the detachments in the infected area nearly every day and of the more remote posts as often as possible to stimulate interest in the work, to further instruct the soldiers and to keep in touch with the changing conditions. On all of these trips of inspection I was accompanied by a ranking Scout sergeant, through whom I issued all orders, also by a Constabulary private, who arrested the men whom it was occasionally necessary to prosecute.

The infected area was limited on the north by a creek near the barrio of Ylang, on the south by the Taloma River, on the east by the sea, and on the west by the Apo mountain range. Many of the animals in the barrio of Taloma were infected and this condition presented a grave danger to the large herds to the south; therefore, our first efforts were directed toward cleaning up this district. In all of the work, the scheme of daily inspection, the absolute prohibition of the movement of all classes of domestic animals, the immediate slaughter of all sick and directly exposed animals with a through chemical disinfection of contaminated corrals and wallows, was carried out as thoroughly as possible.

The enforcement of the quarantine of carabaos and cattle in the town of Davao proper interfered seriously with business, so it was desirable to hasten the accomplishment of the task there. Accordingly, I had Mr. Burris remain in Davao much of the time for the first few weeks. No soldiers were used in the town of Davao, as two efficient native policemen were detailed for the service by the municipal president, Lieut. W. H. Dade. The infection in Davao yielded readily to the measures initiated so that during the last week in January it was possible to relieve a few work carabaos and cattle on pass and under guard from quarantine during the days just preceding and following the arrival of boats. The quarantine provisions against horses and dogs were, of course, never enforced in the town of Davao, for obvious reasons.

No animals were slaughtered except under my personal direction with the exception of a few suspected cases which I directed Mr. Burris to destroy whenever unmistakable symptoms developed. In almost every case the owners readily consented to the slaughter, and there were but few exceptions. I recorded

the names of owners, the class of animals, estimated the value of all animals slaughtered, and in accordance with the laws of the province submitted this list to the district governor. No provision has been made for the indemnification of these owners. In my report to Brigadier-General Pershing I recommended that payment be made for part of the value of these animals. The provincial authorities fully realize the justice of such payments but in view of its revenue available the province is not able to reimburse the owners.

As a result of the methods instituted no cases of rinderpest developed in the town of Davao after January 16 and none in Taloma after January 12. The cases in Taloma were the last discovered south of the Davao River, so from the middle of January we were able to concentrate our efforts on the district north of the river. Considerable losses were sustained in this district during the latter half of January due to infection occurring among animals at Sasa and at Panacan. The disease persisted in these two barrios until February 2, but offered no danger to other animals as they were secured under guard and subject to daily inspection.

The last case appeared on February 2 and the quarantine was maintained in full force until March 2 in accordance with the plan decided upon during the inspection trip of the Director of Agriculture to Davao on February 17.

Realizing that some danger remains through undiscovered cases and contamination of wallows and swamp lands, we have closed the heavily infected trail between Taloma and Davao against use by carabaos and cattle, and by municipal ordinances have warned the people not to pasture their susceptible animals in certain sections.

Lieutenant Dade, president and district health officer of Davao, has consented, at my request, to maintain Constabulary patrols who will inspect the cattle of the infected area twice weekly to make sure of prompt detection if the disease reappears, and to enforce the quarantine on this trail.

To the best of my knowledge the total loss sustained by the district of Davao during this epizootic was 2,535 cattle and 133 carabaos, a total of 2,668 animals. Of these 372 died after our arrival on December 14, 1910, and about 200 of the 372 died during the first week before I was familiar with the conditions. Of the 372 only 82 were slaughtered as "exposed" or "infected." The term "exposed" signifies that the animals were considered as being in the incubation stage of the disease.

The success attending this work may be attributed principally to three factors:

(a) Adequate laws and ordinances of the province, which, coupled with the influence of the officials, enabled us to maintain the necessary rigid quarantine and to accomplish the slaughter of infected and exposed animals.

(b) The satisfactory transportation which permitted constant inspection of suspects, thus rendering their slaughter possible in the incubation period before they became highly infectious.

(c) The use of the Philippine Scouts, who proved to be a most efficient arm for effective quarantine service.

The work of the Scouts can not be commended too highly. They followed instructions implicitly and intelligently, took a keen interest in the work and refrained from abusing their authority. I feel confident that the situation could not have been handled successfully if their services had not been available.

I received the most cordial support and coöperation from all of the officials with whom I came in contact, and I am especially indebted to Lieutenant Dade who, as municipal president, exerted an invaluable influence.

Efforts to trace the source from which the infection entered the district were unsuccessful. The original supposition that it was carried down from Surigao by deer or wild hogs as hosts, was not supported by facts, as no infection was discovered among wild animals. I tried to secure deer for exposure to infection that their susceptibility might be demonstrated conclusively, but did not succeed in obtaining subjects until the infection had subsided. I am of the opinion that the infection was introduced into the town of Davao through importation from Cebu, and that it smouldered there several months before enough animals had succumbed to provoke its recognition as an epizootic. The first case was observed by Lieutenant Dade on October 8, 1910, in the town of Davao. Later it spread across the river into the large herds in the adjacent fields.

While in Davao, the Director of Agriculture directed that I investigate the eastern coast of Mindanao as to the existence of rinderpest, provided I could make the trip within a reasonable period of time. The conditions were such that I considered it inadvisable to leave Davao for this purpose. Lieut. H. H. Smith, consented to perform this task, and his report shows that no disease exists within that region.

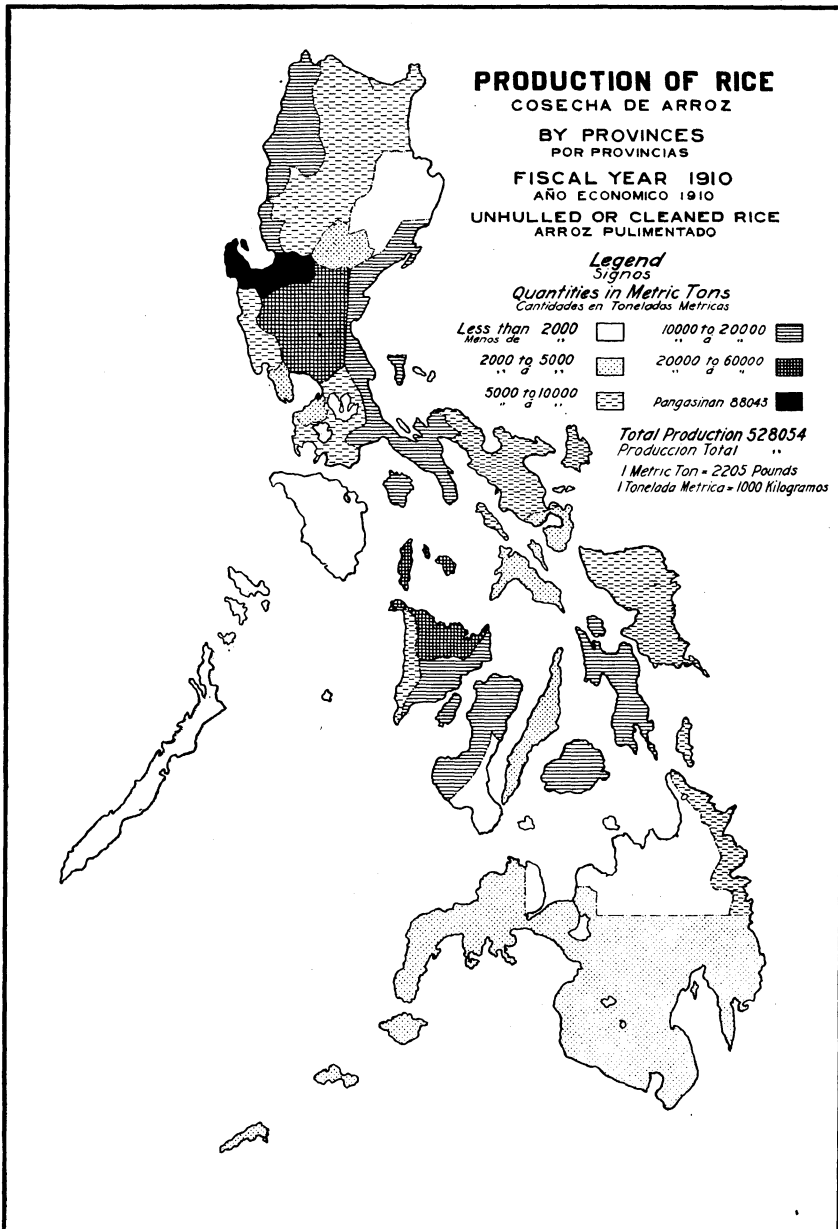
STATISTICS REGARDING RICE AND HEMP GROWING IN THE PHILIPPINE ISLANDS.

By W. D. HOBART, *Statistician.*

STATISTICS ON RICE IN THE PHILIPPINE ISLANDS, FISCAL YEAR 1910.

Province.	Amount of paddy produced.	Equalling in cleaned rice.	Area cultivated.	Cleaned rice per hectare.
	<i>Cavans.</i>	<i>Metric tons.</i>	<i>Hectares.</i>	<i>Kilos.</i>
Agusan.....	6,400	179	765	234
Albay.....	209,421	5,864	17,107	343
Ambos Camarines.....	341,550	9,563	24,728	387
Antique.....	342,446	9,588	31,933	300
Bataan.....	149,986	4,200	8,261	508
Batangas.....	263,974	7,391	38,492	221
Bohol.....	397,748	11,137	33,059	337
Bulacan.....	1,239,687	34,711	52,016	667
Cagayan.....	301,841	8,452	21,249	398
Capiz.....	903,222	25,290	69,226	365
Cavite.....	174,371	4,882	15,036	325
Cebu.....	82,298	2,304	6,638	347
Ilocos Norte.....	652,691	18,275	43,170	423
Ilocos Sur.....	576,919	16,154	39,080	413
Iloilo.....	591,574	16,564	45,254	366
Isabela.....	39,353	1,102	3,142	351
La Laguna.....	231,373	6,478	18,229	355
La Union.....	675,496	18,914	44,630	424
Leyte.....	441,454	12,361	22,957	538
Mindoro.....	41,919	1,174	3,578	328
Misamis.....	69,375	1,942	6,629	293
Moro.....	108,084	3,026	6,182	489
Mountain.....	319,416	8,944	17,369	515
Nueva Ecija.....	2,153,718	60,304	90,778	664
Nueva Vizcaya.....	95,130	2,664	6,284	424
Occidental Negros.....	620,804	17,383	29,154	596
Oriental Negros.....	69,287	1,940	3,862	502
Palawan.....	58,491	1,638	5,292	310
Pampanga.....	1,056,907	29,593	71,686	413
Pangasinan.....	3,144,392	88,043	175,703	501
Rizal.....	329,852	9,236	16,758	551
Samar.....	312,914	8,762	15,830	553
Sorsogon.....	151,195	4,233	16,549	256
Surigao.....	179,320	5,021	12,506	402
Tarlac.....	1,687,708	47,256	135,255	349
Tayabas.....	516,712	14,468	30,244	478
Zambales.....	322,058	9,018	18,510	487
Total.....	18,859,086	528,054	1,192,141	442

The difference between the various provinces in the production per hectare is in part accounted for by destruction or curtailment of crops in some of them through drought or storms; or because of locusts, rats or other pests or blights.



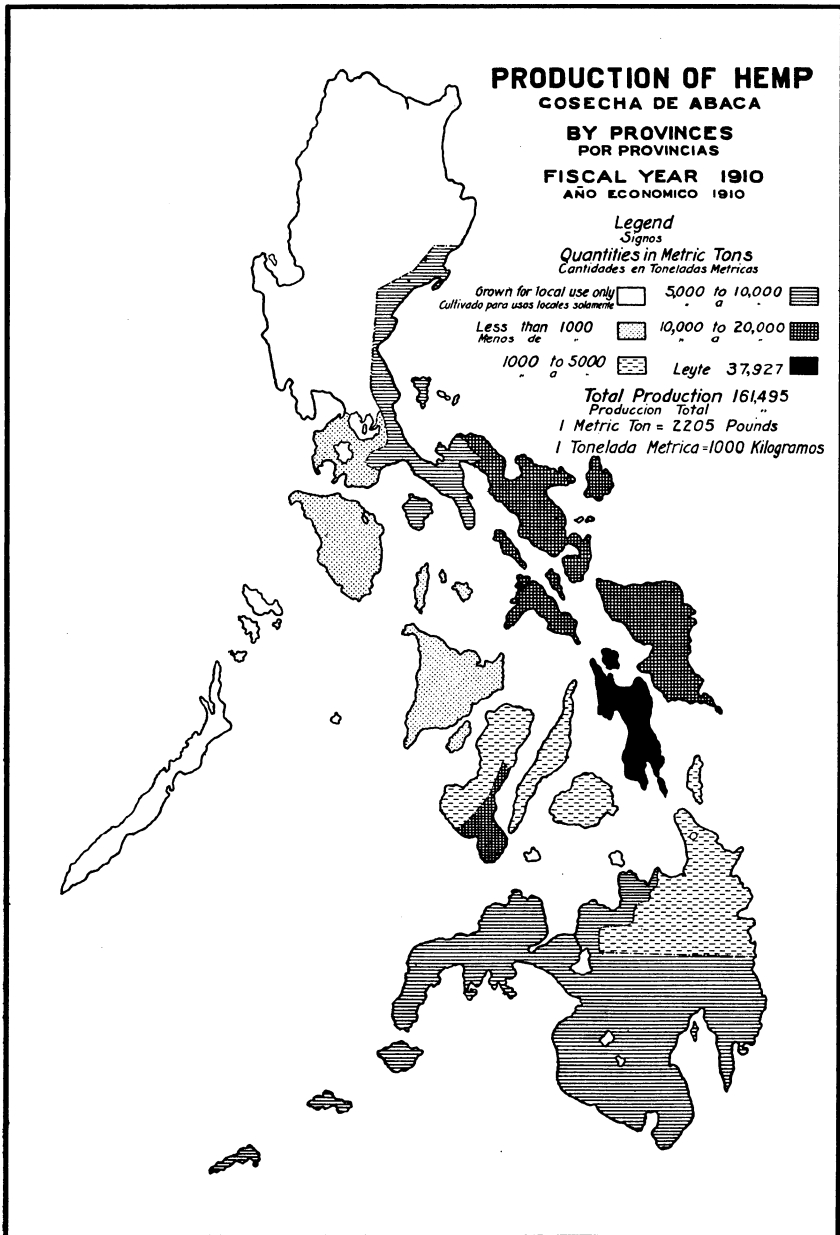
THE PHILIPPINE ISLANDS.

STATISTICS ON HEMP IN THE PHILIPPINE ISLANDS, FISCAL YEAR 1910.

Province.	Amount of hemp produced.		Area cultivated.	Production per hectare.
	<i>Piculs.</i>	<i>Kilos.</i>	<i>Hectares.</i>	<i>Kilos.</i>
Agusan.....	24,563	1,553,610	2,394	649
Albay.....	316,154	19,996,740	91,776	218
Ambos Camarines.....	269,202	17,027,027	101,600	167
Antique.....	2,090	132,192	1,009	131
Bataan.....			5	
Batangas.....	1,964	124,223	659	189
Bohol.....	23,317	1,474,800	7,082	208
Bulacan.....				
Cagayan.....			26	
Capiz.....	14,829	906,309	7,234	125
Cavite.....	11,820	747,615	1,929	388
Cebu.....	40,854	2,584,015	9,095	284
Ilocos Norte.....				
Ilocos Sur.....				
Iloilo.....	7,254	458,815	1,647	279
Isabela.....				
La Laguna.....	13,243	837,620	6,650	126
La Union.....				
Leyte.....	599,636	37,926,977	69,191	548
Mindoro.....	5,179	327,572	1,105	296
Misamis.....	111,552	7,055,664	11,466	615
Moro.....	135,848	8,592,386	16,410	524
Mountain.....				
Nueva Ecija.....				
Nueva Vizcaya.....				
Occidental Negros.....	16,828	1,064,371	4,659	228
Oriental Negros.....	172,016	10,780,012	17,359	621
Palawan.....			1,300	
Pampanga.....			3	
Pangasinan.....				
Rizal.....			10	
Samar.....	298,832	18,901,124	27,593	685
Sorsogon.....	387,172	24,488,629	75,091	326
Surigao.....	61,868	3,913,151	5,085	770
Tarlac.....			2	
Tayabas.....	149,554	9,559,290	14,756	648
Zambales.....				
Total.....	2,663,275	168,452,144	475,136	355

The great differences between the various provinces in production per hectare is in part accounted for by the fact that it has not been found possible to obtain information as to what proportion of the hemp plants reported are actually in bearing.

It is well known, too, that in many localities where low grades are grown the price obtained has not paid for harvesting, so the crop has been allowed to go to waste. In other localities lack of labor has made it impossible to harvest at the proper time resulting in partial or total loss of the crop.



THE PHILIPPINE ISLANDS.

THE CONSTITUTION AND BY-LAWS OF THE INSULAR AGRICULTURAL ASSOCIATION OF THE PHILIPPINE ISLANDS.

(Adopted February 24, 1911.)

ARTICLE I.—*Name.*

This Association shall be known as The Insular Agricultural Association of the Philippine Islands. It shall consist of active, associate, and honorary members, and shall have its headquarters and offices in Manila.

ARTICLE II.—*Object.*

The objects of this association are to promote harmony and coöperation between the farmers of the country, to study and become familiar with the most modern methods in tropical agriculture, to defend the interests of the farmers of the country, and to promote the general development of agriculture as the foundation of the future prosperity of the Philippines.

ARTICLE III.—*Officers, etc.*

SECTION 1. The officers of this association shall be a president, first vice-president, secretary, treasurer, and a vice-president for each province represented at the regular annual meeting of the association. The term of office of the president, first vice-president, secretary, and treasurer shall be one year or until their successors are chosen. They shall without delay transfer to their successors all property belonging to the association.

SEC. 2. The provincial vice-presidents shall be divided into three classes. The first class shall hold office for a term of one year, the second class for two years, and the third class for three years. Their successors shall hold office for three years, one-third of class being elected each year. New officers shall be elected by ballot each succeeding year at the regular annual meeting of the association. A majority vote of all of the active members of the association shall be necessary for an election to each office. A vacancy in any office shall be filled by an appointment by the president until the next regular election.

SEC. 3. The president, first vice-president, secretary, treasurer, and provincial vice-presidents shall constitute a board of directors which shall control the general policy of the association, subject to such regulations as the active members of the association shall, by a two-thirds vote, prescribe when actually assembled in the regular meetings of the association.

SEC. 4. The duties of officers, requisites for membership, times of annual or other meetings of this association, and such regulations as may be necessary for the government of the same shall be provided for in the by-laws.

BY-LAWS.

ARTICLE I.—*President.*

SECTION 1. It shall be the duty of the president to preside at all meetings of the association, to present an address at the annual meeting following his election, to preserve order and decorum, and to direct the discussions.

SEC. 2. The president shall represent the association and the board of directors at all agricultural expositions, congresses, conferences, associations, or meetings at which the association desires to be represented. This, however, is not to be construed as interfering with the election of other delegates or representatives which the association considers it desirable to send to such expositions, congresses, conferences, or meetings.

SEC. 3. He shall see that the various officers of the association perform their duties in compliance with the constitution and by-laws of the association.

SEC. 4. He shall authorize over his signature the payment of all bills contracted either directly by the association or by its properly appointed representatives.

ARTICLE II.—*First vice-president.*

SECTION 1. The first vice-president shall discharge the duties of the president in case of the absence, sickness, or inability of the president to attend to the same.

ARTICLE III.—*Secretary.*

SECTION 1. The secretary shall, in a book provided for the purpose, keep a copy of the constitution and by-laws of the association, together with such amendments as shall be made from time to time, which shall be open to the inspection of all members; he shall have general care of all books, papers, and documents belonging to the association.

SEC. 2. He shall keep careful and exact lists of the names of all active, associate, and honorary members of the association, together with their addresses, province by province and town by town; he shall keep a record of the minutes of all meetings of the association, and shall present or read the minutes of the last meeting of the association to the members at the next regular meeting for their approval.

SEC. 3. He shall draw warrants to be countersigned by the president and paid by the treasurer, covering all bills which have been legally contracted by the association; he shall convene the members of the association on the call of the president, the board of trustees, or on the request of not less than one-third of the active members of the association.

SEC. 4. When so ordered he shall prepare an annual report on the work of the association, or prepare a bulletin, which shall be issued monthly, quarterly, or annually, as ordered by the board of directors, furnishing information regarding the improvement of tropical agriculture, the market price of agricultural products, and other matters of interest to the farmers of the country.

ARTICLE IV.—*Treasurer.*

SECTION 1. The treasurer shall collect all fees, assessments, and bills due, and have charge of the funds of the association; he shall give security for the trust reposed in him whenever the association may deem it requisite.

SEC. 2. It shall be the duty of the treasurer to put all of the moneys of the association into one fund to be appropriated for the payment of current expenses and for such other uses as the association may direct.

SEC. 3. He shall pay all bills which come into his hands duly approved by the president and secretary.

SEC. 4. At each annual meeting he shall give a detailed statement of all his official receipts and disbursements which statement must be duly audited and approved by the board of directors.

ARTICLE V.—*Provincial vice-presidents.*

SECTION 1. The provincial vice-presidents shall act in an advisory capacity to the president, first vice-president, and secretary, and their duties on the board of directors shall be primarily in this capacity.

SEC. 2. They shall be the active representatives of the Insular Agricultural Association in their respective provinces, and it shall be their duty to promote the organization of provincial,

municipal, and other local agricultural associations for the purpose of stirring up an enthusiastic interest in modern methods of agriculture on the part of the farmers of the country, and enlisting, so far as possible, the interest and active coöperation of every farmer in carrying out the policy of the Insular Agricultural Association for the development of Philippine agriculture.

SEC. 3. They shall, from time to time, either personally or by correspondence, advise the president and secretary of the association regarding the progress being made in their province along the lines laid down by the association.

ARTICLE VI.—*Board of directors.*

SECTION 1. The board of directors of the Insular Agricultural Association shall meet on the call of the president, during the regular annual meeting of the association, for the purpose of discussing and considering such matters regarding the policy of the association as seem necessary for the proper carrying on of its work and for carrying out the policy outlined.

SEC. 2. Other meetings may be held in Iloilo, Cebu, or Zamboanga, should the time and convenience of the members demand it.

SEC. 3. The president shall preside at all meetings of the board of directors, except in case of his absence or disability, when the first vice-president or the secretary shall assume the duties of the president. The secretary of the Insular Agricultural Association shall be Secretary of the board.

SEC. 4. All questions presented to the board for discussion and deliberation shall require at least a two-thirds vote of the members of the board for their adoption.

ARTICLE VII.—*Purposes.*

SECTION 1. The purpose of this association shall be to promote harmony and confidence among farmers and the general agricultural development of the country.

SEC. 2. It is observed that many of those engaged in the leading occupations of this country are well organized. This association will, therefore, hold meetings of farmers in all parts of the country from time to time to bring them to a realization and understanding of the unity of their interests.

SEC. 3. It will study the needs of the farmers of the country and hold meetings, or farmers' institutes, at which the officials and members of the Bureau of Agriculture shall be invited to give lectures or talks on modern methods in tropical agriculture,

at which the actual adoption of these methods to conditions existing in the Philippines may be discussed, by the farmers themselves, with the representatives of the Bureau of Agriculture.

SEC. 4. The members of the association will coöperate with the Bureau of Agriculture for the purpose of making practical demonstrations of the best methods of growing the staple crops of the country, after the manner of the farmers' coöperative demonstration work in the United States.

SEC. 5. It shall from time to time invite the dealers in agricultural products to attend its meetings, to have them present the conditions of the local market and the world market for the staple products of the country, and to discuss with them ways and means for improving farm product and market conditions in different parts of the Philippines.

SEC. 6. It shall promote the organization of provincial, municipal, and local agricultural associations.

SEC. 7. It shall promote and support the holding of Insular, provincial, and local agricultural expositions, fairs, congresses, conferences, and meetings.

SEC. 8. It shall interest itself in the building of good roads, securing better transportation for farm products, the general improvement and making of life in the country more profitable and satisfactory.

SEC. 9. It shall work for the enactment of laws to protect and promote the best interests of the farmers of the country, namely: (a) To relieve the present financial stress among the farmers of the country by enabling them to get satisfactory titles to their lands and to borrow money from the Agricultural Bank, (b) to establish agricultural credit banks in different provinces, (c) to provide for an agricultural member of each provincial board who shall coöperate with an agricultural committee in every municipality for the purpose of studying agricultural conditions and needs, and making reports on the same from time to time to the officials of this association, and to the Director of Agriculture, for the purpose of securing such coöperation and assistance as the Insular Government can give.

SEC. 10. In addition to the regular annual meeting, it shall meet from time to time, at such times and places as shall be decided upon by vote of the members, the board of directors, or the call of the president, as often as the interests of the members and the work of the association seem to demand.

SEC. 11. It shall send representatives to other tropical agricultural expositions, congresses, conferences, etc., in the Far

East or in other parts of the world, who shall submit a verbal or written report or both, as ordered by the president or board of directors, on the exposition, congress, or conference visited for the benefit of the members of this association.

SEC. 12. It shall work for the organization of a Far Eastern agricultural association, including the agriculturists in those countries who are working on the same agricultural problems as we have to solve in the Philippines, namely, Indo China (including Cochin China and Siam), British North Borneo, Dutch East Indies, Australia, New Zealand, Federated Malay States, Ceylon, and India.

ARTICLE VIII.—*Membership.*

SECTION 1. The members of this association shall be divided into active, associate, and honorary.

SEC. 2. The active members shall include the founders of the association; they must be actual landlords, part owners, lessees, managers of farms, or actually engaged in some branch of agricultural work or research.

SEC. 3. The associate members shall include those who are either directly or indirectly interested in the progress of farming in the country, such as dealers in farm products, shippers, members of chambers of commerce, or boards of trade.

SEC. 4. The honorary members shall include those, who on account of their distinguished position, coöperation, and assistance actually given to the association and to the farmers of the country, shall be elected to such membership by the active members of the association.

SEC. 5. All members shall be elected by a majority vote of the active members of the association. Candidates elected to active membership shall become active members when they have signed the constitution and by-laws binding themselves to conform to them, and paid the required fee to the treasurer of the association.

SEC. 6. Associate and honorary members shall not have the right to vote, neither shall they be eligible for any office, or as members of the board of directors of the association. The secretary shall record in separate lists the names of associate and honorary members.

ARTICLE IX.—*Fees.*

SECTION 1. The membership fee of this Association shall be three pesos (₱3) per annum. No other fees shall be assessed upon members except those necessary for defraying the actual

and necessary expenses of the association, which must be ordered by a two-thirds vote.

ARTICLE X.—*Order of business.*

Roll call.

President's address.

Program.

Communications from board of directors.

Election of new members.

Unfinished business.

Reports of committees.

Miscellaneous business.

New business.

Appointing of committees.

Minutes of preceding meeting, or meetings.

Adjournment to date or *sine die*.

ARTICLE XI.—*Quorum.*

SECTION 1. A majority of the members shall constitute a quorum for the purpose of transacting business.

ARTICLE XII.—*Program committee.*

SECTION 1. The secretary of the association, together with at least three other active members appointed by the president shall constitute a program committee, of which the secretary shall be chairman.

SEC. 2. It shall be the duty of this committee to arrange and prepare programs, which shall consist of instrumental and vocal music, addresses, lectures, papers, literary productions, discussions, etc.

SEC. 3. The regular programs shall follow the general line of work done by farmers' associations which shall include talks, lectures, papers on subjects relative to the staple crops of the country, other subjects of interest to agriculturists, and discussions of the same, for the general improvement of country life.

ARTICLE XIII.—*Affiliations.*

SECTION 1. This association shall not affiliate itself with any political party or religious sect, and any demonstration of a political or religious nature is strictly prohibited as intending to interfere with the harmony of the association and its work, which is for the benefit of all farmers or agriculturists and those interested in the agricultural development of the country, regardless of their political beliefs or religious views.

ARTICLE XIV.—*Interpretations.*

SECTION 1. All questions regarding interpretations of the constitution of this association shall be referred to the board of directors, and the same shall be determined by a two-thirds vote of the members of the board.

ARTICLE XV.—*Removal and expulsion.*

SECTION 1. Officers of this association may be removed from office on their failure to comply with the constitution and by-laws and to discharge the duties required of them, or for other sufficient reasons, upon recommendation of the board of directors and a two-thirds vote of the members of the association.

SEC. 2. Members of this association, who on account of their failure to pay the required dues or assessments, on account of lack of interest, or of behavior such as would become a detriment or discredit to the association, may be expelled upon the recommendation of the board of directors and a two-thirds vote of the members of the association.

ARTICLE XVI.—*Amendments.*

SECTION 1. Members desiring to amend the constitution or these by-laws shall make such recommendation in writing and present the same to the board of directors for their consideration and approval.

SEC. 2. Proposed amendments to the constitution, or these by-laws which have been approved by the board of directors, shall be printed or typewritten so as to show the exact changes intended and a copy shall be sent to each member of the association by the secretary at least three months previous to the next regular meeting or special meeting which shall be called expressly for this purpose, at which time the proposed amendment or amendments if adopted shall be approved by a two-thirds vote of the active members of the association.

MONTHLY VETERINARY REPORTS—MARCH AND APRIL, 1911.

There have been numerous minor changes in the rinderpest situation during the month, but no marked change in the general situation.

Cagayan and Isabela.—One municipality is infected in the Province of Cagayan and three in the Province of Isabela.

Pampanga and Bulacan.—There has been a marked improvement in the Province of Bulacan, and only two municipalities remain infected. The efforts of the Bureau of Agriculture have resulted in still holding the disease in check in Pampanga Province.

Rizal.—During the past month rinderpest has been recognized in four municipalities.

Nueva Ecija.—No disease has been reported during the past month.

Tarlac.—The number of infected municipalities has been reduced to three.

Pangasinan.—The principal operations of the Bureau of Agriculture against rinderpest are being carried on in this province. There is a chain of infected municipalities extending from Tayug to Lingayen, and thence southward to Urbiztondo. There is also an extensive infection of the mountainous country in the western part of the province. About 450 Philippine Scouts are employed in quarantining the plains district. While it is not deemed wise to declare any of the infected municipalities clean as yet, it is evident that the rigid quarantine enforced, is producing favorable results. The provincial and municipal officials are convinced of the good results following the quarantine. A special effort has been made in the campaign in this province to disseminate information regarding the purpose of the quarantine and, in general, the methods of combating rinderpest. An interpreter, possessing a fluent knowledge of the Spanish language, has held meetings in every infected municipality in which operations are being carried on. Interpreters possessing a knowledge of the native dialects are coöperating with him.

Benguet.—The quarantine placed on the Benguet Road near

Camp One, has effectively prevented the infection of the Province of Benguet.

Nueva Vizcaya.—Only two municipalities are infected in this province, and it is believed that disease was introduced by wild deer which have been reported from various localities as dying from some disease. An effective quarantine against Pangasinan Province is being maintained.

La Union.—Infection exists in Aringay and Agoo. Sick animals are being slaughtered there and the owners compensated for the value thereof. This measure is meeting with popular approval, and bids fair to secure and hold the coöperation of cattle owners of this province in the work of the Bureau of Agriculture in eradicating disease.

Visayan Islands.—The situation in the Visayas remains practically unchanged. Strong hopes are entertained that there will be a great improvement before the end of the month. No general outbreak exists. About 300 Philippine Scouts are employed on quarantine duty in the Province of Oriental Negros where the heaviest infection exists.

Moro Province.—A representative of the Bureau of Agriculture has returned from the District of Davao reporting that region free from rinderpest. The report of Dr. C. G. Thomson, in charge of that work, is published elsewhere in this issue of the REVIEW.

MONTHLY CROP REPORTS—MARCH AND APRIL.

MISCELLANEOUS CROPS.

Cavite.—The extent of the damage done to crops in this province along the Batangas border by the falling of ashes from Taal Volcano is estimated to be approximately ₱85,000. A great many of the inhabitants of the barrios of Ulat and Cabangaan of Silang have moved to other places on this account. It is believed, however, that this volcanic ash will greatly enrich the soil where it has fallen.

Isabela.—In the barrio of Malalang half way between Ilagan and San Antonio potatoes are grown which are as good as those obtained in Baguio. The planting of potatoes in that section of the province should be encouraged.

La Laguna.—In the vicinity of Santa Cruz and Lumban many acres of tomatoes have been planted. The lowlands around the lake are used for this crop. Judging from the rapid growth the soil must be exceedingly fertile in these locations.

Tarlac.—There are many small groves of mangos distributed throughout the province. Also camachiles, lumboy, bananas, etc. Garden vegetables such as tomatoes, radishes, cabbages, and onions are extensively grown.

RICE.

Antique.—Palay is very scarce in the northern part of the province and can not be bought north of Tibiao except in small quantities. The present price is ₱4.17 per cavan.

Cotabato.—The harvesting of the last palay crop has been completed and the Moros of the district appear to be well satisfied with the result of same, although in certain sections they suffered considerable loss from the high water which prevailed during the past three or four months. Five hundred cavans of palay and 350 cavans of rice have been shipped to Jolo and Dumaguete.

Isabela.—Considerable damage has been done to the rice crop in the municipality of Echague by an insect which destroys the stalks of the plant.

Oriental Negros (Siquijor).—The rice crop on this island was in fine condition and about ready to harvest on March 1.

Tarlac.—The second rice crop that is being grown where irrigation is practicable is in good condition and there is a good stand. Not all of the available ground is planted, however, probably because of lack of labor.

Zambales.—The farmers throughout the province are busily engaged in preparing their rice lands for the next crop. Although the crop just harvested was quite large prices continue high, palay bringing ₱2.60 per cavan on the local market.

SUGAR CANE.

Antique.—The northern end of the province continues to report very good results with sugar cane. Some sugar has been shipped from Bugason, Tibiao, and Culasi. The southern end of the province reports that sugar production will be only average in both quantity and quality. A new hydraulic mill has been installed in Tibiao.

La Laguna.—The farmers in this province were busy during the month of February milling cane. An abundant crop was being harvested.

La Union.—The sugar crop will be a large one, all sugar planters reporting favorably.

Nueva Ecija.—More sugar cane is being planted in this province than formerly.

Tarlac.—That part of the crop which is now growing is in excellent condition and gives promise of a good yield. Much of the land is still being planted. The planting of sugar cane should be encouraged in this province as there is a great deal of land in Tarlac that is suitable for sugar cane.

TOBACCO.

Isabela.—In Echague the planting of tobacco is concluded and most of the farmers are busy tending their plantations, while others are already harvesting their tobacco. The present harvest of tobacco at Echague is satisfactory. The sale of tobacco is over in Tagle and half the harvest in Santiago, Echague, and Cauayan has been sold to various commercial companies. In the northern part of Isabela Province the tobacco crop is being greatly injured by some kind of wilt which seems to be new in this valley. Worms have also done a considerable amount of damage all over the province. The dry weather was prejudicial to the transplanting of tobacco during the month

of January. While the heavy rains at the beginning of February greatly improved soil conditions, it ruined many of the small plants. In some sections, due to the irregular season the date of setting has been unusually irregular, some farmers still transplanting when others were harvesting their tobacco.

La Union.—The tobacco crop will not reach the high mark attained last year, owing to the drought.

Nueva Ecija.—More tobacco is being planted in this province than formerly, and the tobacco that is being produced is of a better grade.

CURRENT NOTES.

THE TRINIDAD GARDEN.

Below the Hotel Pines, near the Baguio Hotel, along the road to Trinidad, out toward the mines, and at Haight's Place, every here and there one sees some of the finest vegetable gardens to be found anywhere in the Philippines. All of these gardens bear witness to the success of the seed distribution and extension work which was undertaken some years ago by the station of the Bureau of Agriculture at Trinidad. At this station the growing of both vegetables and forage plants is being carried on. This garden is located in the Trinidad Valley less than an hour's drive, over a good improved road, from the Government Center.

The Trinidad garden includes an area of about 16 hectares, most of which is under cultivation. It is under the direction of Mr. E. S. Haskell, superintendent, a force of about forty Igorot and Ilocano laborers being employed. The garden is approximately 1,500 meters above sea level and the climate like that of Baguio is delightfully pleasant.

The work of growing vegetables was undertaken at the Trinidad garden a few years ago on account of the scarcity of vegetable growers in and about the summer capital. During the past two years this work has reached the stage where it is an unquestioned success, and as a consequence many of the Igorots and Ilocanos are starting vegetable gardens of their own. Every morning one can see them at the hotels and cottages scattered over the hills with large baskets of vegetables to supply the tables of the many summer residents.

Among the vegetables which have been grown in considerable quantities are beans, beets, cabbage, carrots, celery, Swiss chard, sweet corn, cucumbers, eggplant, kohlrabi, lettuce, onions, parsley, peas, radishes, squash, tomatoes, turnips, mulberries, huckleberries, and strawberries. During the season of 1910 ₱200.40 worth of cabbage, ₱399.43 worth of beans, ₱436.87 worth of peas, ₱385.75 worth of tomatoes, and ₱702.84 worth of berries were sold. The vegetable crop alone sold for

₱4,098.68. Strawberries have been a very popular product. The sales of strawberries to April 15 of the present season amount to about ₱2,300, and the total sales of vegetables to about ₱4,300. There is every prospect that in a short time the commercial gardens will supply an abundance of vegetables to meet the demand for about eight months of the year and it is probable that the Government garden will soon be relieved of the work of growing vegetables and fruit for commercial purposes.

THE AGRICULTURAL BANK.

In a recent report Secretary Gregorio Araneta, of the Department of Finance and Justice, gave out the following statement on the operation of the Agricultural Bank of the Philippine Government since its organization:

The Agricultural Bank of the Philippine Islands was opened on the 1st of October, 1908. It was therefore in operation for only nine months during the fiscal year 1909. During the fiscal year 1910, 148 applications were made for loans, amounting to ₱497,574. The number of loans granted was only 89, amounting to ₱229,000. Five loans amounting to ₱7,200, were repaid. Delinquent interest on five loans amounted to ₱1,415.24. Three loans amounting in principal and interest to ₱14,045.24 were pending on foreclosure proceedings.

The total amount loaned by the bank at the close of the fiscal year 1910 amounted to ₱284,450, or approximately 28½ per cent of the bank's capital. Of this amount only 5½ per cent was placed during the fiscal year 1909, and 23 per cent during the fiscal year 1910.

Although the number of applications decreased considerably as compared with the nine months of the preceding year, when they amounted to 417, the number of loans made greatly exceeds the number placed for the previous nine months, during which time only 23 loans were granted. In other words, the number of loans made in 1909 were but slightly in excess of 5½ per cent of the number of applications received, while the number of loans made during the year 1910 amounted to 60 per cent of the applications received for the year. The increase indicates a clearer understanding on the part of the people of the purposes and requirements of the bank.

When it is considered that the creation of the bank was in response to a necessity felt by all agriculturists, and that the Government sought by this means to assist in the development of agriculture, it is somewhat discouraging to note the little business done by the bank. This is owing principally to the lack of titles to the greater part of the agricultural lands. It is hoped that with improved facilities for obtaining titles the Agricultural Bank will be better able to carry out the beneficent purposes of its organization. One of the good results already accomplished is the decrease of usury in the provinces.

The expenses of the bank during the year amounted to ₱1,204.84. The receipts amounted to ₱19,499.05. Deducting the expenses and the deficit of the previous year, amounting to ₱1,638.83, there remains a net profit of ₱16,655.38.

THE INCREASE IN GOVERNMENT REVENUE.

According to the financial reports from the different Bureaus for the first eight months of the fiscal year 1910-11 received by Governor-General Forbes there has been a net increase of revenue amounting to ₱1,700,000 over the same period of the fiscal year 1909-10. This increase of revenue is about evenly divided between the Bureau of Customs and the Bureau of Internal Revenue. The Governor-General states that while the increase is very gratifying it was not unexpected.

The total revenues of the Government for the fiscal year 1909-10, which were a little over ₱42,000,000 were divided as follows:

Customs	₱17,625,699.37
Internal revenue	10,231,734.44
Miscellaneous	11,230,955.36
City of Manila	3,014,284.99

THE BALANCE OF PHILIPPINE TRADE.

The following summary of the trade in the Philippine Islands for the year 1910 is given by the Hon. Gregorio Araneta, Secretary of Finance and Justice:

A comparison of the imports, valued at \$37,061,925, with the exports, valued at \$39,886,853, shows a balance in favor of the Islands of \$2,824,927, which increases the average annual net balance in favor of the Islands during the period of the American occupation to \$324,954. These figures include only the value of merchandise received through regular commercial channels and do not include the value of supplies and property imported by the Federal and Insular Governments, free entries on account of Government-aided railways, commercial importations of currency, and free mail importations, aggregating in all \$4,837,925. A large part of this privileged merchandise, consisting of cement, structural iron, and other material, has contributed to the general development of the business of the country, involving, as it does, the employment of labor in all parts of the Islands.

There were also exported to the United States, and not included in the foregoing figures, articles belonging to or carried in the baggage of outgoing passengers to a total value of \$54,553.

FRUIT EXPERT FOR THE BUREAU OF AGRICULTURE.

For some time the Bureau of Agriculture has had under consideration the matter of employing a fruit expert. It is believed that it is possible to supply a part of the demand for fruit in the Philippines which is at present supplied largely with fruit imported from the United States, Australia, and New Zealand. To this end the Bureau of Agriculture has been fortunate in securing the services of Mr. P. J. Wester, a tropical fruit expert from the United States Department of Agriculture.

Mr. Wester has for some time been engaged in experimental work at the Botanic Gardens in Miami, Florida, and only recently relinquished that work to take up this larger field of work in the Philippines. He is now engaged in making a study of various citrus fruits, such as oranges and lemons, mangoes and other tropical fruit. He hopes to bud and graft the superior varieties of oranges, such as navels and California sweets so as to convert the Philippine orange districts into producers of valuable fruit to supply home demand if not for export.

The larger part of the Philippine orange crop is such that it can be used only for local consumption. It is stated that during the past season more than three times the normal annual yield of oranges grown in the Batangas district were shipped out in about sixty days and it is estimated that the total crop shipped from this section amounted to about 10,000 tons. In case Mr. Wester is able to carry his experiments to a successful issue there is little doubt that the demand for Philippine oranges will be greatly increased and that it will be possible to build up a large trade in Philippine fruits in other parts of the Far East.

Mr. Wester states that during his work in Florida he found a mango known as the Manila mango which was more or less extensively grown by the Florida fruit growers. While he pronounces Philippine mangos by far the finest he has ever seen, yet he believes that they can be improved and suggests the introduction of the new seed-budding process for mangoes, which has been described by him in *The Porto Rico Agricultural News* for October, 1910.

NOTES FROM OTHER FIELDS.

MODERN SUGAR MILLS IN CHINA.

According to the Manila Daily Bulletin of March 28, 1911, an interesting report has been submitted by Mr. J. H. Arnold, the American consul of Amoy, concerning the erection of modern sugar mills in China that will be of interest to local sugar planters.

Mr. Arnold says:

A local Chinese business man, who has accumulated considerable wealth in various business and industrial enterprises in Java, is erecting two modern sugar mills, the machinery for which is being furnished by a Japanese firm, acting as agents for an American manufacturer of sugar-mill machinery.

Many years ago the Amoy hinterland produced large quantities of sugar cane, but the cane was allowed to deteriorate and the native methods of crushing were so crude and wasteful that the industry became unprofitable and was practically abandoned. The owner of these new mills has purchased large areas of land and proposes to use modern methods of growing and crushing the cane. The fact that \$15,000,000 has been invested in modern sugar mills in south Formosa during the past ten years, has encouraged the people of this district to believe that their sugar industry can be made equally profitable. Cane shoots from Formosa and Java are being imported. The bulk of the Formosa cane is the rose bamboo, which was introduced into Formosa from Hawaii.

RUBBER PLANTER'S ASSOCIATION IN COCHIN CHINA.

In order to insure more systematic development and make the rubber industry an important source of wealth for the colony, the principal rubber planters of Cochin China have formed an association, which is to meet at Saigon. According to the Journal d'Agriculture Tropicale, No. 115, this society which already represents large economic interests, will have for its object the improvement of the management of the agricultural and industrial exploitation of *Hevea* in Cochin China, and at the same time protect the interests of its members. At the monthly meetings it is planned to give an account of the work of the association and discuss any important questions that might contribute to the progress of the new industry. It is hoped that this organization will be encouraged by the administration and thus be better able to accomplish its work and make Cochin China an important rubber-producing country.

THE COPRA TRADE IN CEYLON FOR 1910.

Regarding the Ceylon copra trade the Tropical Agriculturist for February, 1911, publishes the following information:

The copra market throughout last year was well upheld, and the figures disclose an improving and firm position for estate owners and producers. The market began for the year with a fair number of arrivals which sold at R84.50¹ per candy² and this satisfactory opening was followed by a continued and steady tone, with prices occasionally attaining to the unprecedented high record of R93.50 per candy, while even the most common and inferior qualities rarely fell below R75 per candy, which at that time constituted a record. It will be readily seen that although fresh areas are yearly being brought under cultivation, the market remains active and there is a disposition on the part of buyers always to respond adequately to the added yield. The market gradually rose from January to the end of April when the record price for the year—R93.50—was obtained. Prices during May were also satisfactory, but then a slight depression was noticeable. About the middle of September there was a revival of the market; on the 12th of that month again parcels were purchased at R93 per candy. These high prices remained stationary, and the market met with continued support till the end of October, but slight indifference was shown by exporters during the two closing months of a prosperous year.

The unexpected rise in prices was due principally to the shortage of the supply occasioned by the severe drought experienced in coconut-producing areas—a drought which unhappily seems to recur with unpleasant frequency—while the increasing demand for nuts for making oil and for the desiccating industry have doubtless contributed toward it in some measure. The actual deficit in the export of copra for the year 1910 amounts to 363,327.09 kilograms (800,000 pounds); the high rate it would thus appear, is not warranted by the prevailing conditions in the copra trade alone, were it not that the exportation of desiccated coconuts has increased enormously, and the activity in the oil industry last year supplied the European and American markets with an output of over 2,744,245.11 kilos (6,000,000 pounds) in excess of the island's export of that commodity in 1909. With larger calls made upon the output of coconuts from these two fast-developing branches of the trade, it is no wonder that the market stood firm with prices which appear to have been so prohibitive that one or two countries withdrew temporarily if not altogether from competition.

While last year's figures compare very favorably with those of 1909, yet there appears to be a tendency among buyers who patronized the local market extensively in years gone by, to seek their supplies outside this colony. For instance, Russia during the year under review was so indifferent as to be satisfied with 7,076,507.05 kilos (15,500,000 pounds), whereas in the previous year she imported exactly double that quantity; Austria and Belgium, two extensive customers originally, also bought no more than half the number of tons they required in 1909; Denmark decreased her purchases by 452,592.09 kilos (1,000,000 pounds); our near neighbor, India, who appeared to be increasing her demand yearly and gave promise of providing

¹ One rupee equals ₱0.64883.

² Candy ranges from 500 to 560 pounds, about 4 piculs, 250 kilograms.

a convenient market for the product, has called for only one-third of her purchases for the previous year; Norway and Sweden have entirely abandoned their purchases.

The ports to which the largest quantities have been shipped during the year were Antwerp, Hamburg, Odessa, and Copenhagen. The countries which have imported more largely and have, in fact, substantially increased their demand are Great Britain, France, and Germany. Of these France has created an enormously inflated demand and has called for twelve times as much as her previous supply during the past twelve months, while Germany has taken twice as much as formerly imported. The island has found a new field in Holland, but this is evidently an experimental importation.

SUGAR MATTERS IN CUBA.

According to the Louisiana Planter, Volume XXXVI, No. 7, there has been a decided falling off in the sugar output for 1911. The total exports to January 31 are 142,217 tons as against 217,272 tons for the previous year showing a decrease or about one-third. The total stock in Cuba amounts to about one-half the amount of stock for the same date last year, thus indicating that the sugar which had been made was rapidly shipped out of the country. It is thought that these data put a serious aspect on the sugar situation in Cuba, as the shortages reported from nearly all the leading ports must have some foundation based upon weather conditions that have been inimical to the ordinarily expected conditions at this time of the year. The increase in the European sugar crop equal in quantity for the year now closing to the entire crop made by Cuba last year, would presumably dispel any hope for better prices that might be entertained on account of the present shortage.

MARKET REPORTS.

NOTES ON MANILA MARKETS FOR MARCH.

By KER & Co.

(Based on advices from New York, February 20th; San Francisco, February 25th; London, March 2d; Cebu, March 25th; Iloilo, March 28th; Hongkong, March 28th.)

SUGAR.

Iloilo.—Market closes quieter, with sellers, no buyers, at ₱7.875 per picul No. 1, ₱7.375 No. 2 and ₱6.375 No. 3.

Manila.—We quote ₱6.75 per picul No. 1, ₱6.25 No. 2 and ₱5.50 No. 3.

Cebu.—Business has been done on a basis of ₱7.25 per picul No. 1, ₱7 No. 2, and ₱6.75 No. 3.

COPRA.

Quiet with buyers at ₱9.25 per picul Manila fair merchantable and ₱9.625 per picul Cebu fair merchantable sun-dried f. o. b.

HEMP.

Market quiet, we quote fair current for America ₱8 and for United Kingdom ₱7.50 per picul f. o. b. Values of better grades are also easier. Receipts at all ports for the three months are 329,771 bales against 302,879 bales 1910 and 305,165 bales 1909.

DISTRIBUTION OF PRINCIPAL PHILIPPINE EXPORTS FOR THE THREE MONTHS (JANUARY TO MARCH, 1911).

Products exported.	United States.	China.	Pacific Coast.	Great Britain.	Continent of Europe.	Australia.	Japan.	India and Singapore.
Dry sugar (tons) -----	5,500	8,559						
Hemp (bales) -----	110,180	2,950	13,170	104,432	23,732	6,010	6,581	2,575
Copra (piculs) -----	4,400		55,200	5,600	185,954		500	
Cigars (thousands) -----	1,483	8,313	4,008	3,153	2,214	1,838	267	3,569

MANILA AND LONDON FIBER MARKET.

Receipts and shipments of Manila hemp.

(Telegram from Manila to London, April 17, 1911.)

	1911	1910
Hemp receipts at Manila since January 1	<i>Bales.</i> 317,967	<i>Bales.</i> 277,583
Hemp receipts at Cebu since January 1	94,619	92,709
Hemp receipts at all ports since January 1	412,586	370,292
Shipments to United Kingdom by steamer, cleared since January 1	165,833	105,067
Shipments to Atlantic coast, United States, by steamer, cleared since January 1	119,843	141,771
Shipments to Pacific coast, United States, by steamer, cleared since January 1	32,998	35,770
Shipments to continental ports, by steamer, cleared since January 1	35,472	17,038
Shipments to all other ports	20,083	
and local consumption since January 1	3,900	
Loading steamer on the berth for the United Kingdom, about	23,083	19,037
Loading steamer on the berth for Atlantic coast, United States, about	5,000	30,000
		17,000

Bales of hemp loading for United States, by steamer *Hallamshire*..... 5,000

FIBER QUOTATIONS.

The following prices for Manila hemp, sisal, and maguey were quoted by Messrs. Landauer & Co., London, and Messrs. Sloan & Mitchell, of Manila, on March 1, 1911:

Manila hemp.—Fine marks have been in renewed demand, and orders cabled for very large quantities have met with little response, the scarcity of this particular grade becoming even more pronounced.

Spot and near hemp, has appreciated in value to a small extent, fair current in dock, and close by selling at £19 to £19 5s, and lower grades at £18 5s. to £18 15s.

Range of prices.

Grades.	London.			Manila, per picul.
	Spot and close by.			
	Per ton.	Per ton.	Per picul.	
Best marks -----	43/- to 46/-	£430.00-460.00	₱26.90-28.75	-----
Good marks -----	41/- to 42/-	410.00-420.00	25.62-26.25	-----
Good current -----	35/- to 36/-	350.00-360.00	21.88-22.50	₱15.60
25 per cent over current -----	22/6 to 23/-	223.00-230.00	13.95-14.35	9.20
Fair current -----	19/- to 19/6	190.00-193.00	11.85-12.10	7.60
Superior seconds -----	18/9 to 19/-	184.50-190.00	11.55-11.85	7.20
Good seconds -----	18/6 to 18/9	183.00-184.50	11.45-11.55	7.00
Fair seconds -----	18/3 to 18/6	181.50-183.00	11.35-11.45	-----
Good brown -----	18/- to 18/3	180.00-181.50	11.25-11.35	6.40
Fair brown -----	18/- to 18/3	180.00-181.50	11.25-11.35	-----

NOTE.—By comparing the above London quotations with those published in last month's issue it will be seen that on the beginning of March the price paid for medium and good grades advanced while that of the lower grades remained stationary.—EDITOR.

Sisal hemp.—No change to be reported. In New York the price remains 3¼ cents per pound, equal to £18 15s. to £19 for fair average quality and £19 15s. to £20 for selected quality per ton.

Manila maguey.—In better demand. Values £16 10s. No. 1, £15 No. 2, and £14 No. 3 per ton, corresponding to ₱10.30, ₱9.50, and ₱8.75 per picul, respectively.

The Manila quotations for the same date were ₱6.60 per picul for No. 1.

ILOILO SUGAR MARKET.

By FIGUERAS HERMANOS.

The sugar market during March has been decidedly quiet. The arrivals for the month amounted to 421,840 piculs, and only one shipment, that of March 14th on the steamer *Verona* destined for New York, containing 88,000 piculs, of superior sugar was recorded. The price on the first of the month was six pesos one and one-half *reales*,¹ with a gradual fall to 5 pesos 6½ *reales* on the 5th. From the 9th there was a gradual improvement in the price to 6 pesos 3½ *reales* at the close of the month.

Exports up to April 2, 1911.

	1909-10 crop.		1910-11 crop.	
	Superior.	Wet.	Superior.	Wet.
United States.....	272,800	-----	121,600	-----
China	64,575	-----	135,972	29.38
Total	337,375	-----	257,572	29.38

¹ One real equals twelve and a half centavos.

PRINCIPAL PHILIPPINE IMPORTS AND EXPORTS— MARCH, 1911.

By the COLLECTOR OF CUSTOMS.

IMPORTS.

Articles.		Manila.	Cebu.	Iloilo.	Totals.
Rice	{Kilos.....	5,731,215	6,772,342	3,874,117	16,377,674
	{Value.....	\$177,737	\$235,738	\$131,096	\$544,571
Beef cattle	{Number.....	2,589		200	2,789
	{Value.....	\$47,026		\$4,971	\$51,997
Eggs	{Dozen.....	371,115	42	83	371,240
	{Value.....	\$30,961	\$4	\$9	\$30,974
Sugar	{Kilos.....	164,761	25,723	19,352	209,836
	{Value.....	\$11,066	\$2,053	\$1,324	\$14,443
Coffee	{Kilos.....	11,679	1,503	877	14,059
	{Value.....	\$4,262	\$842	\$246	\$5,350
Cacao	{Kilos.....	85,681		402	86,083
	{Value.....	\$21,437		\$88	\$21,525
Raw cotton	{Kilos.....				
	{Value.....				

EXPORTS.

Hemp.....	{Kilos.....	10,874,488	2,411,116		13,285,604
	{Value.....	\$1,032,122	\$269,214		\$1,301,336
Copra.....	{Kilos.....	3,201,226	3,834,829	226,712	7,262,767
	{Value.....	\$262,276	\$344,582	\$17,600	\$624,458
Sugar	{Kilos.....	754,653		7,677,308	8,431,961
	{Value.....	\$28,165		\$371,224	\$399,389
Cigars.....	{Thousand.....	9,805			9,805
	{Value.....	\$109,599			\$109,599
Cigarettes.....	{Thousand.....	3,141			3,141
	{Value.....	\$3,994			\$3,994
Tobacco	{Kilos.....	922,364			922,364
	{Value.....	\$127,299			\$127,299

TEMPERATURE AND RAINFALL FOR AGRICULTURAL DISTRICTS IN THE PHILIPPINES—MARCH, 1911.

By the DIRECTOR OF THE WEATHER BUREAU.

[Temperature and total rainfall for twenty-four hours beginning at 6 a. m. each day.]

Date.	Hemp.				Sugar, Iloilo.		Rice, Tarlac.		Tobacco.			
	Albay.		Tacloban.		Temperature.	Rainfall.	Temperature.	Rainfall.	Aparri.		San Fernando.	
	Temperature.	Rainfall.	Temperature.	Rainfall.					Temperature.	Rainfall.	Temperature.	Rainfall.
	°C.	mm.	°C.	mm.	°C.	mm.	°C.	mm.	°C.	mm.	°C.	mm.
1	25.7	-----	27	-----	26	-----	27.2	-----	23.5	-----	23.8	-----
2	25	-----	25.9	-----	25.7	0.3	26.1?	-----	21.5	-----	22.9	-----
3	23.2	10.5	26	13.7	25.8	-----	26.2	-----	21.4	-----	25.2	-----
4	25.3	-----	25.5	.8	25.6	-----	25.8	-----	22.7	-----	25	-----
5	25.8	-----	25.5	-----	25.5	-----	26.2	-----	24.3	-----	25.6	-----
6	23.6	-----	25.1	-----	25.1	-----	26.2	-----	24.4	-----	25.9	-----
7	25.1	-----	25.1	.8	24.9	-----	26.7	-----	24.1	-----	25.2	-----
8	25.5	-----	25.6	-----	25.3	-----	25.8	-----	24.3	-----	26.7	-----
9	26.7	-----	26.9	-----	25.5	-----	26	-----	24.3	-----	26.9	-----
10	25.1	2.5	25.4	-----	25.8	-----	26	-----	24.6	-----	26	-----
11	25	46.2	25.4	26	26.2	6.1	27.4	-----	24.9	2.1	25.5	-----
12	27.1	-----	27.1	-----	27.5	-----	27	1.3	24.8	-----	27	-----
13	27.2	1	25.6	16.5	27.9	-----	27.7	-----	25.5	-----	26.3	-----
14	27.4	-----	26.3	-----	27.1	-----	28.5	-----	25.8	-----	26.6	-----
15	27.7	-----	26.7	1	27.2	-----	28	-----	25.6	-----	26.8	-----
16	27.4	-----	26.5	-----	27.6	-----	28.8	-----	25.8	-----	27	-----
17	27.4	-----	26.6	-----	26.3	16.8	30.4	3.8	26.1	-----	26.4	-----
18	27.2	-----	26.9	6.4	27	-----	29.8	.8	26	-----	27.2	-----
19	26.7	-----	26.9	-----	26.8	-----	29	-----	23.7	.8	26.8	-----
20	27.5	-----	26.2	21.8	26.8	-----	27.8	-----	23.9	-----	28.2	-----
21	27	1.3	26.3	1	27.2	-----	27.2	-----	25.3	-----	27.3	-----
22	27.7	-----	26.6	1.6	27.2	-----	27.8	-----	25.5	-----	27	-----
23	27.1	-----	26.7	-----	27.1	-----	28	-----	26.1	-----	27	-----
24	26.7	5.6	25.8	1.3	27.2	-----	29	9.1	24.2	.5	27.4	-----
25	26.9	13.9	25.7	4.3	27.3	-----	26.9	-----	23.8	1.5	26.8	-----
26	24.3	24.6	25.1	1.3	26.8	-----	28	-----	24.7	-----	27.9	-----
27	25.4	20.5	24.7	13.5	26.6	-----	27.8	-----	25	.8	27.5	-----
28	26.2	10.4	25.2	26	27	-----	28.1	-----	25.1	2.3	27.7	-----
29	27.4	-----	26.8	-----	27.3	4.3	27.9	-----	24.8	-----	28.2	-----
30	27.4	-----	26.9	-----	26.5	-----	27.8	-----	24.6	-----	26.7	-----
31	27.6	-----	26.3	2.8	26.5	-----	27.1	-----	24.6	-----	27	-----

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